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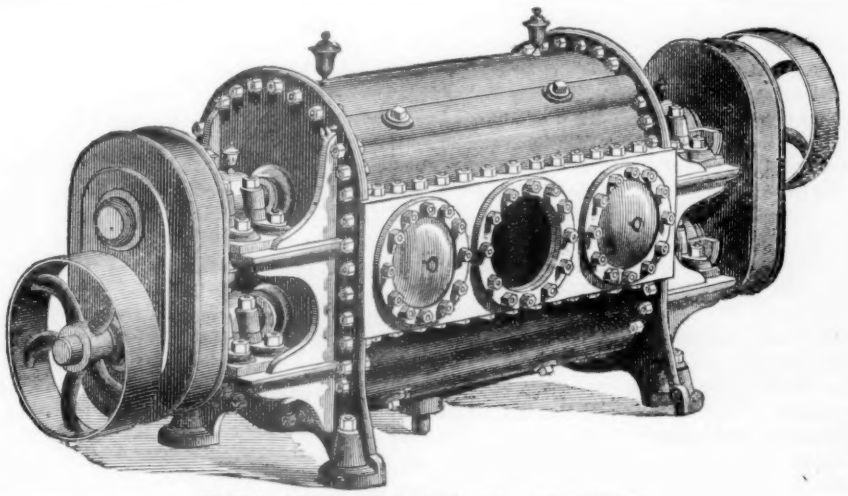
P. H. & F. M. Root's Patent Improved Gas Exhauster.

We herewith illustrate the Root's Improved Exhauster, and would call the attention of engineers and gas companies to the many changes and improvements which they claim to have made in this useful piece of machinery. The patentees and manufacturers now consider their exhauster perfected, and offer it with perfect confidence, claiming that all the imperfections (if any ever existed) have been overcome. It is simple in its mechanical construction; more so than any other exhauster in use.

The internal parts consist of only two revolvers (as shown in small cut), each cast entire in one piece, without a single screw, nut, washer, key, or other part to get loose on the inside; the internal operating parts therefore cannot get out of order; requiring no care or attention. All changes, adjustments, and repairs are made from the outside. The journal bearings, if necessary, can be renewed in a few moments; the internal operating parts are practically gas-tight, but are not in actual contact—hence there is no internal friction or wear—therefore operated with less power than any other, and their durability is almost without limit.

By taking off the covers to the two hand holes on each side, the whole internal parts of the machine are visible. The first two exhausters ever made by Messrs. Root are, and have been in use at the works of the Manhattan Gas-Light Company, New York (18th street and 10th avenue), now over four and a half years. They are also in use at the Cincinnati Gas-Light Co.; Laclede Gas Works, St. Louis; Pittsburgh Gas-Light Co.; Hudson Gas-Light Co., Hudson, N. Y.: and several of these machines are now in course of construction for large gas works in western cities.

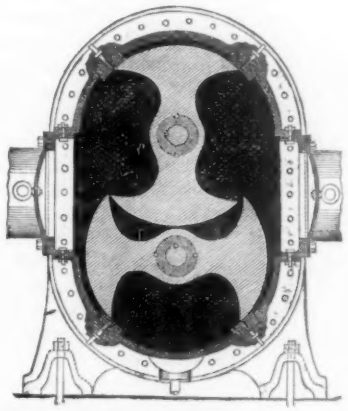
For further information address P. H. & F. M. Root, Connersville, Ind., or S. S. Townsend, No. 31 Liberty street, N. Y.



ROOT'S PATENT IMPROVED GAS EXHAUSTER.

"Iron," on Geology and its Industrial Aspects.

Passing over the departments of dock and harbor construction and of river improvement, where the requirements are of a similar nature, we come to the question of water supply for towns; and here the importance of geological knowledge to the civil engineer becomes very apparent. He has not merely to construct reservoirs, make tunnels, and lay pipes, but he has to decide on the quality of the water, and determine the available quantity that can be obtained. This involves deductions as to rainfall, the nature of the water-bearing rocks, the character of the soil over



large areas as regards retentiveness or porosity, and numberless other questions, to which only geology can give accurate replies. Of late public attention has been drawn to the lakes of Scotland, Cumberland, and Wales, and to deep wells in the chalk and Permian formations as sources of water supply.

The increasing pollution of rivers has rendered these dangerous sources of potable water, and even that of large lakes has its drawbacks, so that, probably, we shall be driven more and more to tap the deeper strata. Surface wells are liable to be contaminated, and the supply is variable, too scanty, and exhaustible; but there is reason to believe that very large bodies of water are available not only in the chalk, but also in some of the older formations. The capabilities of the chalk in this respect are well known; it is not so widely known that the Oolite, the Trias, the Permian, the Carboniferous and Old Red are all more or less water-bearing, and capable, when sunk or bored, of yielding available supplies. Indeed, it is by pumping from such wells that several of our great towns derive the whole or the greater part of their water supply. Here a knowledge of the local structure of the earth's crust, as well as of the texture and other conditions of its component parts, is essential if great expense at the outset is to be avoided.

The deeper the boring the drier the bed may be taken as a general rule; but, depth for depth, strata at a moderate angle of inclination yield a much larger supply than those at high angles, there being, of course, a more extensive sheet to the rise; fields containing intercalated ash and trap beds are always precarious; and areas unbroken by faults and fissures are more reliable than those interrupted by dykes and dislocations. Dykes and faults, indeed, often act as natural dams, impounding all the water in the strata to the rise, and preventing its further percolation to the dip. The results of such obstructions are frequen and abundant springs along their lines, while the rest of the country is comparatively springless. The question of water supply is intimately connected with that of sewage, and even there some acquaintance with geology is not altogether unneeded.

Glycerine for Gas Meters.—One superiority of glycerine over water for this purpose, according to Dr. Heeren, is founded in the fact that, in case water is used, one cubic metre of gas will carry with about 23 litres of aqueous vapors, which the consumer will have to pay for the same as gas.

Chemical Repertory.

No. 133.—June 2, 1875.

EDITOR—HENRY WURTZ.

CHEMICAL EXCERPTS.

1427. The Signal Light at Westminster Palace. The gas signal-light on the clock tower of the Houses of Parliament is now shown from its new position 30 feet higher than formerly. The new lantern is constructed to run in and out of a loop-hole in the roof of the tower—similarly to a ship's gun—so that during the day time nothing is seen of it, and it is now no disfigurement to the appearance of the tower. The illuminating power is a "Wigham's Patent Gas-Light," as used for lighthouses and at present is shown naked, no lenses being used. The light is only visible whilst the House of Commons is actually sitting. Immediately on an adjournment the light is extinguished.

1628. Coal-Tar Colors Without Arsenic.—The following letter appears in the London *Chemical News*:

Sir: I nthe Chemical News there has appeared an article, "On the Production of Aniline Colors without the Use of Arsenic Acid," which mentions our firm, and says that although we succeeded in working this process on a large scale, we were manufacturing our colors only in part by this method. In reply to this assertion, we beg to state that since the end of 1872 we have not been using any arsenic acid in our works at all, and that our magenta or fuchsine, as well as all the other colors manufactured by our firm, are warranted to be produced without the employment of arsenic acid, and to be entirely free from this poisonous reagent. We are, etc.

Meister, Lucius & Bruning.

Hœcht-on-Maine, Feb. 11, 1875.

1429. Ammonia from Gas-Liquor and Vegetation.—The chemist Kohlrausch has continued his experiments on the effect of the poisonous sulpho-cyanates, in sulphate of ammonia from gas-liquor. He defines the following conclusions: Barley is more sensitive to sulphocyanate than wheat; both species of plant sicken, and are dwarfed when manured with either cyanides er sulphocyanides, even when the salt exists in the earth only as 1 to 40,000 (a sulphate of ammonia was used which contained 1·5 per cent. of sulphocyanate); pure ammonium sulphate, even in 160 times the quantity, had no bad effect. Beet, manured with impure sulphate, does not contain so much sugar. As the sulphate of ammonia used as manure is usually a product of gas-works, and always contains iron, a reddish brown salt is to be rejected, as the color betrays the presence of sulphocyanates; gray or white salts may be used without fear. Phosphates should always be examined for sulphocyanates.

1550. William Murdoch.—At a late meeting of engineers, at Glasgow, Mr. J. Thomson said:

"The inventor, of all others, that ought to hand the name of William Murdoch down to posterity was his invention of lighting by gas, which, next to the steam-engine, had done more to ameliorate the condition and advance the comfort of mankind than any other invention of modern times. Murdoch did for gas-lighting what Watt did for the steam-engine. The comprehensive mind of Watt saw all, or nearly all, that the condensing engine was capable of being made, and it was a striking fact that it was still practically the same in principle as when it left Watt's hands. So, in like manner, it was pointed out, Murdoch's apparatus for the production of gas was not materially different from what may be seen in many gas works of the present day. Murdoch was not only the friend and assistant of Watt, but he was also long the mentor of the firm. He was a man of eminent mechanical abilities and inventive genius, and but for being so closely allied with Watt, and overshadowed, as it were, by the greater luster of his name, would have made a name for himself as an inventor and a benefactor of his species, second only to that of his great master, to whom he was most sincerely attached."

1431. Carburation of Iron.—M. Boussingault has communicated the results of his experiments on the combination of carbon, to the Academy of Sciences of Paris. M. Boussingault has found by most careful experiments that carbon exists in carburated iron in various proportions. Steel contains 7 to 1000th parts when hard, and soft 10 to 15. Pig-iron contains 2 to 4-100ths, and sometimes even 5-100ths. The quantity is difficult to settle, as it can only be ascertained in analysis by the difference with manganese, silicium, phosphorus, sulphur, and chromium. The average of the results is 4·4 p.'c. When grey the iron has given up its carbon in the form of graphite; but M. Boussingault found no sensible difference in the quantity of carbon in grey and white pig. In all cases, if the real combination of iron with carbon be admitted, it takes place thus—five equivalents of iron for one of carbon. Whatever be the temperature, it is impossible, says M. Boussingault to make more than 5 per cent. of carbon enter the iron; this is the limit.

1432. The Barometer as a Colliery Safeguard.—From a paper recently read before the Royal Society by Mr. R. H. Scott, we learn that of the explosions of fire-damp which occurred in the Yorkshire district in 1871 and 1872 only about 25 per cent. could not be accounted for on meteorological grounds. A sudden relaxation of atmosphericpl pressure, usually occasioned by the change to southerly winds, or, in the height of summer, by excessive heat, favors the accumulation of carburetted hydrogen, continually in course of production by the decomposition of the coal, while it checks the ventilation necessary to dilute the gas bolew the explosive standard. The law requires that after dangerous gas has been found in any mine, a barometer and thermometer shall be placed near its entrance above ground; and ample directions with respect to the indications afforded by these instruments have also been furnished. But looking to the bearing of Mr. Scott's statistics, it is to be feared that those responsible for the safety of the mines and miners have paid little attention to the warnings of these monitors. Whether from ignorance or carelessness, many lives seem to have been sacrificed which, by a little attention, might have been preserved.—*Iron.*

1443. Phosphorescent Mixtures.—The following colors can be obtained very readily: *Green*—Hyposulphate of strontia, heated for fifteen minutes over a Berzelius lamp, and for five minutes over a blast lamp until it is fused, yields a yellowish-green color after exposure to sun-light. The same color can be obtained by taking equal parts of carbonate of strontia and *lac sulphuris*: heat gently for five minutes, then strongly for twenty-five minutes over a Bunsen burner, and finally five minutes over a blast. This mixture is granular, and yields a fine green color, darker than the preceding. *Blue:* Sulphate of strontia is is prepared by precipitating with sulphuric acid from chloride of strontium; the precipitate is dried, heated in a current of hydrogen gas; then over a Bunsen burner for ten minutes, and for fifteen or twenty minutes over a blast lamp. The product sometimes yields a yellow phosphorescent light, and, when this is the case, it is necessary to give it another turn over the blast lamp. *Yellow:* Sulphate of baryta six parts, charcoal one part, fused over a blast lamp, at first afforded no light, but, after twenty-four hours, gave an orange-yellow light. After the powders are prepared, they can be stirred into melted paraffine; and by means of a brush any pattern or design may be put upon glass. By protecting the glass in a frame, the powder will retain the property of glowing for a year or more. The use of the paraffine is to protect the powders from the action of moisture and prevent decomposition. As a general rule, it is better to hermetically seal the mixtures in flat bottles, when they will retain their properties for years.—*Brit. Mail.*

1434. Diffusion of Light by Transparent Minerals.—J. L. Soret has examined whether a perfectly homogeneous and non-fluorescent medium can be illuminated by the passage of a pencil of solar light. The possibility of a lateral propagation of light in such cases is contrary to what has been hitherto admitted on the undulatory theory. Most fine specimens of hyaline quartz, pure enough to be employed in the construction of prisms, are not perfectly homogeneous, and when traversed by a pencil of solar light they display the phenomena of illumination. The trace of the rays is very visible—completely polarized, On examining this trace it is generally found due to diffusion, either in consequence of slight defects of crystallisation, or to minute cavities. Some very pure and rare specimens are free from the power of illumination. Yellow quartz (common topaz) is strongly illuminated: the trace of the luminous pencil is blue, and presents a complete polarization. When a pencil of rays, previously polarized, is caused to pass in the direction of the crystallographic axis, the beautiful experiment of M. Lallemand upon liquids possessing rotatory power is reproduced upon a small scale. A very pure specimen of amethyst was found completely void of illuminating power. Smoky-quartz is in general far from homogeneous. These observations appear to prove that the power of illumination only springs from deficient homogeneity.

Third Semi-Annual Meeting of the American Gas-Light Association,

At Washington, D. C., May 12, 1875.

[Continued from page 201.]

The President (Mr. Price). With the consent of the Association Mr. Nettleton will now volunteer some remarks in regard to the condition of the finances.

It will be observed by members that this being an adjourned meeting—a semi-annual meeting—the fifth, sixth, seventh and ninth sections are not in the order of business. There is no report to be made by the executive committee, no report of the Treasurer, and no election of officers of course at this meeting; but it may be interesting to the Association to know the condition of our finances, and for that purpose Mr Nettleton will make a short statement upon the subject.

Mr. Nettleton—Mr. President: Those who were present at the last meeting in October will remember that Mr. De Mill was the Treasurer, and was obliged by his engagements to leave at the close of the first days' proceedings. He made up his Treasurer's account to that time, and handed it to me with the money that was in the treasury. That money I took, put in my safe, and never opened the package for four months. At that time I began to look around to see whether Mr. De Mill was going to be present at this meeting. I found his account as he had stated it, giving a balance of $246·50. The money was correct. I found, however, that the question of who were members? what was due the Association? what had been paid? and who had paid it, was in a very chaotic condition. There was no accurate list of members, or of those who had paid; but the papers, in a body, were handed to me. Some few days ago I took these documents, one by one, and went over them to examine and ascertain, if I could, who were members of the Association, who had paid their dues, and from whom money was owing?

I found some $380 due the Association, and to the gentlemen owing I sent a card, stating that there appeared to be money due from them to the Association, and asking them to remit the same to me. Although I was not the Treasurer, but only the Secretary of the Association, still I had whatever treasurer's books there were in my possession. Since that time I have received from these gentlemen, I think, $115 of the $390. Every day I have received more or less, and I have no doubt those from whom it is due will continue to pay, so that all, or nearly all, will eventually be received.

Up to this morning the Association owes $271·10; $94 and some cents is a balance due A. M. Callender & Co., for printing the record of our proceedings The whole amount, I think, was $444, of which I paid $250.

I have deemed it judicious to spend on behalf of the Association the sum of $77·10 for books, some of which I have here, and one or two of which are at my office; and also for postage on those books sent to the various members. The item of postage alone amounted to some $35. The amount now owing by the Association, as I said, is $271·10. I have cash in my hands to the credit of the Association $89·61, leaving due $181·59. To meet that we have the dues of which I spoke, amounting to nearly or quite $300. I have no doubt that will be paid. That amount does not include the initiation fee of any of the gentlemen who have been elected as members of the Association this morning.

The annual meeting of the Association occurs in October. I have thought and found it best as I conceived to arrange the dues year by year, the year ending October, the time of the annual meeting. My books are so arranged, and the accounts are based, and will be based, upon this mode of action.

Judging from what I see here this morning, we shall raise money enough, or nearly enough, to pay all we owe, so that from 112 members prior to the election of members this morning, numbering 20, making 132, there will be raised some $600 as annual dues, at $5 each, which sum will be abundantly sufficient, as I conceive, to pay all reasonable annual expenses. We shall have no considerable expense for books hereafter. Whatever the Association sees fit to print of the proceedings in the same form as they were printed last year, that of course will not entai- so large an expense, as it will involve only the printing of one year's meetings, as against the cost of printing the past proceedings of three years in one volume.

[The reports of special committees being in order, the report of the special committee on "naphtha gas" was called for.]

Mr. Neal—Mr. President: I rise with some reluctance to make my report, or rather to make an apology for not so doing, because I am convinced that the expectation of hearing a report upon the subject of naphtha gas has drawn a large number of the members of the Association together. I do not say that the attractions of the city of Washington, and the opportunity of meeting our respected friend, Mr. McIlhenny, has not had its weight; but on my way from Boston every person interested in the manufacture of gas has asked me the question—"are you going to report? What are you going to report on the subject of naphtha?"

I am satisfied that there is a great deal of interest felt in the solution of this question of naphtha gas.

From the records of the last meeting I find that—"Mr. Lewis of Detroit moved that a Committee of three be appointed to report to this convention *to-morrow*, on the value of naphtha-gas as compared with coal."

I am surprised that Mr. Lewis should have made that motion. I do not think that he apprehended the magnitude of the subject. That motion was carried, and the President appointed Meesrs. Neal, Cartwright and Clegg.

That afternoon I remarked that it would be impossible for the committee to make a report in so short a time. It was expected that we should have a very exhaustive report in so short a time. It was reported that we would have a very exhaustive report prepared that afternoon.

I see from the record that I made this remark: "Mr. President, you will recollect at our meeting yesterday there was a committee appointed on the subject of naphtha-gas, of which I am the chairman. When are we expected to report?"

The President replied, and he spoke with authority—"That will depend upon the committee." Then during the last of the session, Mr. Littlehales moved that the committee be especially requested to investigate and report to the Association upon the following points in reference to naphtha gas, which was seconded and carried; first, the cost per thousand feet for material; second, for labor; third, cost for purification; fourth, wear and tear of retorts; fifth, the cost per thousand for gas at consumer's meters, calculated on gas paid for; sixth, the rate of wages; seventh, amount of capital required per million feet annual make, to construct works for naphtha, as compared to that for coal.

You will see that the President was right in saying that it would be left with the committee. Those questions were put to us to answer. As long as you have come to Washington principally to hear the report of the naphtha committee, I may occupy some of your time in stating what has been done on the subject.

I do not intend to extend my remarks. I will speak on the question and to the question. The committee consisted, as I have said, of Messrs. Cartwright, Clegg and myself. The house was divided, I resided in Boston, the Hub. Mr. Cartwright resided in Philadelphia, Mr. Clegg in Dayton, Ohio.

You will observe that it was impossible for us, without going to considerable trouble and expense, to meet personally very often. Each one of us, however, decided that we would examine into the matter, take the question into consideration, and that whenever we heard of any naphtha-gas works being near enough to us in our travels, so that we could visit them, we would do so; and that we would take the same action in the case of works using naphtha or petroleum, in conjunction with gas-coal, putting the result of our investigations together, and then, if possible, we would draw up a report.

Since the committee were appointed, Mr. Cartwright and I have had some correspondence, and we had also one interview in Boston, where we talked over the subject to a considerable extent and length. We have considered it very carefully. I wrote to Mr. Clegg for his opinion, giving him mine at length—not my opinion directly on the naphtha question, but my views upon the propriety or possibility of making a report at this meeting. From some cause or another his letter was delayed, and I did not receive it until this morning. He, however, coincided exactly with me. The committee are perfectly unanimous in regard to the report, which I will state.

When they were appointed I suppose the President noticed that I was quite enthusiastic on the subject of naphtha gas. I was. I had an idea, or was strongly impressed with the belief that there would be some method or process discovered, by which gas could be manufactured, at much less cost than at present, by the aid of naphtha or petroleum; but since then I have been disappointed in my investigations. I do not say that the committee think it is decided, or sure that naphtha gas is a failure, By no means. They have no right to suppose such a thing. But the committee first relied upon the result of the manufacture of naphtha gas, or naphtha gas in connection with coal gas, upon what might be done at the gas-works at Brooklyn, known as the Citizens Gas-Light Company. We looked upon that company as the great champion of naphtha gas, and when we heard that they had abandoned it we were disappointed. I understood that various reasons are given why that process was abandoned. It may be resumed in a very short time—may be a temporary shutting off.

We relied, however, upon their figures and facts, and as that company has given up for the present, at least, the use of naphtha—that means of information is taken away from us. I do not express any opinion and the committee do not know whether they have given it up temporarily or permanently.

Then at some other works—we might say the Peoples—we supposed that the results were very satisfactory, but find that they have concluded for the present, at least, to manufacture gas from coal. There are different processes of manufacture, but we do not speak in behalf of any patent whatever. We simply cover the whole ground, speaking of petroleum and naphtha gas, no matter by what process it may be manufactured.

Although we are disappointed in the result, we hope that some method will be presented to us which will be perfectly satisfactory. Because any particular process of manufacturing gas from naphtha has not succeeded, that is no reason why it should not succeed in the future; and acting as I do for the Charlestown Gas Company, apart from my position as a member of the committee, it is my duty in all proper ways to discover, and try all proper means to discover, some method by which the cost of gas may be reduced. That is the great desideratum. As the President has said—in consequence of the hard times people find fault with their bills, although I might add that the is perhaps no greater than has been charged them heretofore. They have not the ability to pay them that they had in past years.

There is also another thing to which the President did not allude; the fact that kerosene is cheaper than daylight. That is a very strong expression—but kerosene *is* very cheap; and many of our best consumers are leaving us, who, if they do not burn kerosene in whole, do so in part. It is *very* cheap.

That is a reason why I, not only as a member of the committee, but as Treasurer and Engineer of the Charlestown Gas Company, am interested in finding some substitute—not perhaps a substitute, but something that may be used in connection with coal, by which the cost of the gas may be lessened. I therefore feel an interest in the subject. If the committee should now, on the spot, make a final report, it might be unfavorable, and that I do not think we have any right to do.

So far as the committee are concerned they are perfectly willing, and would be glad to be relieved from the duty imposed upon them, and give it up to some others. It seems to be necessary, in order for the committee to make a full, complete, and exhaustive report, that that committee should themselves go and personally inspect works where naphtha gas is made alone, or in conjunction with coal, or anything else. It is almost impossible for me to attend to that duty, and I am still, however, willing to do what I can in that line.

A letter was received by the secretary and sent to me, from Mr. Cathels of Montreal, Canada, suggesting that in order to get a satisfactory report it might be necessary to employ a committee and pay them. I do not say this because I wish to be paid. If there is any committee to be paid then I will not be a member of it. I do not ask it. He suggested, however, that it might be necessary that the committee have authority to pay some person to make this investigation. Prof. Wurtz wrote me quite a long letter touching this matter, and said that from what he had noticed, and what had been said to him, he had heard that kerosene was a powerful competitor against gas, and he suggested that some chemist should be employed, and he would be very glad to attend to that duty, to make a thorough investigation of the matter. I merely speak of this to show the feeling of those connected with gas works. It may be necessary for the committee to employ some one. I do not think the committee can make a report that would be at all satisfactory, if you merely get the hearsay of such and such persons. For instance, people say such a person or engineer makes gas at a cost of 50 cents or 75 cents a thousand feet, etc., etc. The only way is to go and visit the company and examine their books, if they are willing.

I think there there is too much opposition to naphtha gas, simply because it is a new thing. It may be that the manufacture of gas from naphtha may prove a perfect failure. We do not know. But, although the committee have been unfortunate in their investigations, or have been disappointed, I do not think it would be right for them or for this association to abandon the subject and decide that it is not expedient to attempt any further inquiries in that regard. I think that further investigation should be made by this committee, or by any other committee whom the association may see fit to appoint, to test this matter fully.

In the Harlem works gas is manufactured principally from coal, but naphtha is used as an enricher.

Now, the question comes before you, whether the use of naphtha as an enricher instead of coal, will be of benefit to the companies and to the consumers.

Bear in mind I am speaking not only for the companies but for the consumers. If it will be for the advantage of the stockholders and the consumers then I will say use it. I understand from gentlemen connected with that company that the results are very satisfactory. In the Newark works I understand from a gentleman who is here present, they have been using naphtha, and also making an air gas, as it is called.

The committee do not stand up for or propose to favor any particular patent. It would be highly improper for them to do so. I would say further, that the committee, or rather some members of it, visited works in Pennsylvania where clear petroleum gas or naphtha gas was used, and the light is a very good one. It is a very beautiful thing, and seems to be giving satisfaction. The difficulty there seemed to be that it was necessary to charge too high a price for the gas, although it might be four or five times better in quality. There are other works where naphtha or petroleum is used alone.

Now the question might come before the committee whether they would recommend that a gas company manufacture gas from clear petroleum or naphtha, or in conjunction with coal, as the field is very large. It is a great subject to handle, and the committee confessed their inability to handle it as it ought to be, with the time at their disposal. All of us are busy. Who has a greater responsibility, and who ought to be more busily employed than the engineer of a gas company, especially during this last winter? We have had a very severe winter and h ve suffered a great deal from the effect of the frost. We have all had as much as we could attend to. If it is expected of the committee, or of any member of this board, that they can give all the time that is necessary in examining this subject, it is expecting an impossibility.

I am sorry to disappoint gentlemen. The committee regret deeply that they were not able to make a report, but I do not think we have any right to make one simply for the sake of doing so. We can put a great many words together, and can perhaps make an interesting report, but when it is done and read the members might say, "What of it? What have you proved? What have you shown?" That is one position to-day, that we are not able to make a report, although we regret very much that we cannot do so.

I will speak for the committee when I say that the present members of it are perfectly willing to resign their position, if the association will appoint some other gentlemen in their places who can give more attention to the subject. I have been instructed by the committee to make the foregoing statement and to ask for further time. I hope that members will express their views if there is anything to express them upon. The secretary suggests that if there is any information to be given to the committee, at this time or hereafter, we will be happy to receive it if we remain on the committee. We would like facts and figures.

I owe an apology to the association in behalf of the committee, for occupying so much of their time. What I have said has been rather discursive; perhaps it has not been exactly to the point. It may be unsatisfactory to you who have expected a report, but I hope you will pardon the committee for not doing so, because under the circumstances we considered it would not be expedient. Our report would have been good for nothing if we had made it as this meeting.

After various motions had been made and not seconded, and after some discussion, Gen. Hickenlooper said;

Mr. President; It seems to me that this matter has gone to a point where it should be thoroughly investigated, or the committee discharged. The chairman says that for lack of time they have failed to make the investigation complete. He also mentioned incidentally that it was a question of dollars and cents; that they themselves did not feel authorized to incur the expense of making the investigation. It appears to me if the [subject is worthy of consideration at all, there ought to be allowed by the association an appropriation of a sufficient sum to enable the gentlemen to employ such assistance as they may deem necessary to make a thorough investigation; a partial investigation will amount to nothing. It will not be as much as we know ourselves at the present time. I think certainly we ought to either discharge this committee or furnish them with means to make a full and complete investigation to settle the question.

After some debate the following motion was offered by Mr. Burtis;

"That the committee be instructed to report at the next annual meeting of the association, such facts as they may obtain in regard to the process of the manufacture of gas from naphtha." Carried.

Mr. Neal—Mr. President: I rise to present my resignation as a member of this committee, and ask to be discharged from further duty upon it. Remarks have been made which have not been very pleasant to the committee, who have done their duty as far as they could. No one who has not acted upon this committee knows the difficulties in the way of coming to a solution of this question, and yet we hear gentlemen denouncing us as not being enthusiastic, not giving time, etc. We have done the best we could. I most respectfully ask to be excused from further duty upon the committee.

Mr. Richardson—I hope the gentleman will not press that. I know he has been to a great deal of trouble of trouble in investigating the subject, and it would be a great pity if we lost the experience that he has gained.

Mr. Harbison—I trust the gentlemen will not be excused. I do not think there a half dozen men in the room who agree with the reflections cast on the committee, and it would therefore be unfair and unkind to all the rest of the Association that he should be excused, simply because one or two think that he has not done quite all that could have been done.

General Hickenlooper—I unite with the gentlemen in hoping that the gentleman will not be excused, as I have expressed myself before that they have the confidence of the meeting, probably to a greater extent than any other persons who could be selected.

Mr. Nettleton—Mr. President: It is with exceeding regret that I hear this request made by Mr. Neal. I thought the Association had selected the best committee they could possibly have obtained from their whole number. The object sought by that investigation is the ascertainment of whether gas made from naphtha can be made from a less number of dollars and cents than it can be made from coal That fact is what the members of the Association want. This committee, to my certain knowledge, have spent a great deal of time, and a great deal of thought and labor; and no gentleman here, if he knew what had been done by them, would cast the slightest reflection of want of dilligence in their office, but would, on the contrary, say—"well done, you have acted faithfully; we will sustain you; we honor you, and will be under obligations if you will go ahead and do more."

If a new committee is to be appointed, I do not where it shall come from in the Association which shall command so well the confidence of the whole Association, and the confidence of the gas interests of the country as the present one. This committee have made a large investigation. They are in possession of many facts. They are in possession of the general field, and as the object sought by Mr. Burtis, believe, was this—that the committee should report such facts as they had obtained—I think it is wrong to say that that committee has not been diligent. The subject that they undertook to investigate is larger than any man knows (or begins to know) until he undertakes to do it htmself—until he gets into it. There is more of it; it is of great magnitude, ramifying in all directions. It is a new field to be travelled over by persons reaching out this and that way, and every man searching for the best information and the most accurate he can get. By all means I hope Mr. Neal will withdraw his request and consent to continue to act on the committee, that we may have information which will be of benefit to the whole interests of this country, and of the other country also.

I do not suppose that the making of gas from naphtha is yet matured, but it is making progress from day to day; and as I expressed myself to some gentlemen this morning, I believe in allopathy and I believe in homeopathy, so to speak, and I believe in coal and I believe in oil gas, and the question will come up finally and be settled, whether it is better for one man in one place to make it from coal, and for another man in another place to make it from oil, or whether the two should be combined. This is a field in which knowledge is making progress from day to day, from year to year. What is the practiced information of to-day, or what is known to-day as a fact, may be left far behind in the next six months, and here is our committee to ascertain and report that fact. If we can better ourselves I have nothing to say, but it does seem to me that we should be going a great ways in a retrograde movement to change.

After some discussion Mr. Beatley moved that the resignation of Mr. Neal be not accepted, which motion was carried unanimously.

The President (Mr. Price)—Gentlemen: I wish to say personally, that I hope Mr. Neal will accept this as a sufficient apology for anything that may have been said which looked like a censure upon the committee, and that he will cheerfully serve, and bring us in such a report as he is able to make at the next annual meeting. I think I appreciate very fully the immensity of the labor that he has performed. I once gave my attention to this thing for three or four months almost consecutively. When the system which was vaunted so loudly was set in motion at Saratoga, when naphtha was held out by the GAS-LIGHT JOURNAL as being the great thing which was to take the place of coal as a material for making gas, I made a journey to Saratoga and investigated it. I afterwards paid $25 to have a canvass made of the consumers in Saratoga to see how they regarded that gas, and I have corresponded very extensively upon this question. I therefore know something of the greatness of the work which Mr. Neal has upon his hands, and to have discharged him now would have been, I think, to have wasted all the labor which he has heretofore expended.. I hope he will most cheerfully consent to remain on the committee as its chairman, and bring before the association, at its next annual meeting in October, the results of what he has already done, and what he may do in the coming six months.

Mr. Neal—Mr. President—I thank the gentlemen for this token of their confidence in the whole committee (as I do not of coorse take the compliment to myself entirely), and I will continue to discharge the duties to the best of my ability on one consideration; that the members will drop this subject and proceed to business—discuss the question before them at once. We came here to hear discussions upon other subjects. I think there are two papers to be read, if not more, and I am anxious to hear them. Let us avoid any preliminary tactics. We are in a bad place for these, and if this thing continues I do not know but what we might commence to call the roll backward and forward.

Mr. Neal then requested that the executive committee now report what work they had laid out, giving programme of exercises, including recreation.

Mr. Dennison—Mr. President: It was not expected that the Executive Committee were to do anything or say anything, except at the annual meeting, in the regular order of business. We are subject now to, and under the command of Mr. McIlhenny. The order of business has been submitted to him, and he has made the arrangements which are about in this way. There will be an excursion to-morrow morning and a banquet in the evening at half-past five. It was intended to have had the banquet at half-past six, but some parties who wished to leave on the evening

train, requested that a change be made, and I understand Mr. McIlhenny to have made that change in the programme. The banquet will therefore begin at half past five, which will enable those who can eat in three hours to get off. Those who cannot secure enough in that time, Mr. McIlhenny will make arrangements to have remain here.

Mr. McIlhenny—Mr. President: The tickets which have been given to each member designate that the excursion goes to Mount Vernon, and will return here at any time at the pleasure of the excursionists—say three or four o'clock in the afternoon. The boat leaves the wharf at half-past ten.

Mr. Walker (Milwaukee) then read his paper on "Sunday Labor," at the request of several members of the Association.

[This is the same paper which was read by the Secretary to the Association at its meeting in October, 1874, Mr. Walker being unable to be present at that time, and was published in the proceedings of that meeting, in the AMERICAN GAS-LIGHT JOURNAL, vol. 21, pp. 181 and 182, and on pages 135-143, inclusive, of the "Proceedings of the Association."]

Mr. Harbison—Mr. Presieent: I desire to say a word in sustaining what Mr. Walker said in his paper, what Mr. Forstall has said in his communications, and what has been said by other gentlemen in the profession in regard to this observance of the Sabbath in gas works. That suggestion was made by Mr. Ward, our President, and has been up to today faithfully carried out, and is our invariable rule of practice every week. I say, sir, that everything stated by Mr. Walker is true in regard to the observance of the Sabbath in the making of gas; and I will go further than Mr. Walker has gone. I will say that the subject of the labor is not determined by the observance of the Sabbath, because since Mr. Walker left us, quite a long number of years ago—I do not now remember how many—we had a strike of the workmen in our works, notwithstanding we did not work on the Sabbath. That strike was broken up and we went on successfully with the men. The gas company carried their way and the men submitted; those who were the ringleaders were discharged and we put other men in their places.

But in behalf of the men I will say it is true that they do better during the six days of the week, in consequence of having the Sabbath. Their own desire for one day in seven urges them on to do their best in the production of gas. We do not find that as a company we make a less percentage of earnings because we observe the Sabbath. We find that the men are not of a class who get intoxicated on the Sabbath, because they are not at work, but that they attend the church to which they belong. And I go further than Mr. Walker has gone, and say that the manager of a gas-works, in my opinion, does not perform his whole duty to the men employed by him, if he simply, once a week, or once a month, pays them their wages. I think it is his duty to look after those in his employ as much as he can. In regard to the subject of intemperance in gas works, I do not think that gas-workers are a more intemperate set of men than those in any other calling, and I speak from personal experience, in having charge of the works in some respects. How often I get intoxicated myself it is not necessary for me to say. But in regard to the men, and in their behalf, I am now speaking. There have not been, among all the men employed by the Hartford Gas Company, but two single exceptions which have come to my knowledge, within four years, of an employee becoming intoxicated. One had been repeatedly reproved and was finally discharged. The only other exception was a stoker, who is now under probation, having fallen once in four years, and that fall was some six months ago or more. That was not because he was off work on the Sabbath, but because he had more money in his pocket than he had been accustomed to handle for a long period. In regard to the work of the benches we do not allow the heat to increase over working heat on the Sabbath, because we are shut down. We carefully adjust the dampers so that the heat of the benches may not be increased, and then the general rules laid down by Mr. Walker are carried out, of stirring up the fires a little while before charging, and having them in good condition before the retorts are drawn. Of course it is understood by the gentlemen that the charge is left in the retort, during the time we are not making gas, until the time of beginning again.

But I think that the managers of gas works are very greatly to blame personally, if they are not able, as many of them say they are not, to introduce this system of the observance of the Sabbath. I know there are some gentlemen connected with this Association—I will not name any names, because it is not necessary—who have said that if there were any laying off to be done, they would prefer to do it on Monday morning rather than on the Sabbath, because that is a better day to get another class of workmen to make any repairs that might have to be made in their works. That is not a sound theory and principle. I do not believe in making gas on the Sabbath and letting the men have Monday for recreation. I think that would lead to intemperance and various other evils, besides being wrong. I cannot conscientiously keep men unnecessarily at work on the Sabbath and satisfy my conscience that it is right, and go to church myself if I choose to. I think it is a duty I owe to them to give them the privilege of going. I know in comparison with other cities similarly situated, in respect to the cost of the raw material to ourselves, that we make as much of a percentage on our capital and business as they do, so far as my information goes, with about a corresponding consumption and cost of coal, the running expense not varying much from theirs, and we only work six days in the week and observe the Sabbath. I do not think it ought to be considered simply as a question of dollars and cents. If a manager of a gas works can so manage his works as to pay his stockholders a fair remuneration they ought to be satisfied; and I believe that he can do it, and at the same time furnish the gas consumers at a rate at which they would be satisfied, still observing the Sabbath.

There has been a good deal said here as to the comparative cost of kerosene and oil gas. I am a little afraid that gentlemen will find they are themselves to blame when their consumers drop from gas and take to the use of kerosene oil, and I think this running your works seven days in the week, and making your men mere machines to wear out in a few years, has a good deal to do with it. I believe that you would have a better quality of gas from the same material, by running six rather than seven days. I believe that Providence will bless all efforts in that direction.

I am not exceedingly strict, as those who know me best will say. I think that this matter of consumers going into the use of kerosene is because some of the companies may be too grasping, and want to make too large profits. They do not keep their gas up to the standpoint that they should. I think if there was a little more attention paid to that there would be less kerosene used. Pay a little regard to the burners used, and all the other incidentals of the business. I hope that the observance of the Sabbath may be thoroughly discussed. There are a great many points connected with it to be drawn out.

I know the question of storage has a great deal to do with it, but if we can go through a winter's consumption with our storage capacity, and if in some works it may be necessary to work on the Sabbath in the winter because of the very short amount of storage, that reason cannot hold good in the summer season, when the consumption is less. There is sufficient capacity of storage to give the men at least half the time of the Sabbath during two-thirds of the year if there be storage sufficient to carry on works successfully during the other portions of the year. I think for that reason that managers and superintendents generally could introduce the system.

If the variation of temperature of the retorts is not allowed to change much during the time of laying off, the leakage alluded to will be very small indeed, and the quality of the gas will not deteriorate in consequence. A great deal might be said on this subject, and I hope that gentlemen generally will speak about it. It is a matter of great interest, and it is a duty which they owe to themselves and to their workmen that it should receive more attention.

The association adjourned for dinner.

[To be continued.]

Gas Items.

EGGS AND GASES.—Crace Calvert, the distinguished English chemist, who was a victim of the Vienna Exposition, dying of disease caught there, made some interesting experiments on eggs with different gases.

"In dry oxygen gass, eggs are unaffected unless punctured. Moist oxygen decomposes the eggs. In moist nitrogen eggs will keep three months. Hydrogen the same. Eggs, whether pierced or whole, were perfectly preserved in carbonic acid, dry or moist. Illuminating gas the same. In chlorine water (1 to 500) eggs kept eight months in a closed vessel. In a solution of dilute chloride of lime, eggs would not keep ten days. Lime-water and sulphate of lime kept them a little longer. Carbolic acid solution (1 to 500) preserved them about six weeks."

GAS-WELLS.—Our predictions of some years since—generally deemed at the time fit matters *de lunatico inquirendo*—as to the immense national importance of *natural gas* in the near future, are being slowly but surely verified. Among the numerous statements is one that borings for oil on the Red Bank Creek, far east of the Butler oil-field, give torrents of gas. A western Pa. paper tells us also that "a number of wells will be put down in Beaver valley for natural gas. Messrs. Blake & Fessenden intend putting one down for the use of their file works. The owners of the paper mill at Beaver Falls intend putting one down also, and it is rumored that a company have leased the wells at Bennett's Run, to convey the gas to Beaver Falls, where it will be furnished for fuel."

We also learn from Pittsburgh, May 13, that "A line has been surveyed, along which it is proposed to run a six inch pipe for the purpose of conveying the natural gas from the well near Sayersville, Butler county, to this city. It has been estimated that this size of pipe can carry a million feet of gas every 24 hours."

PORT JERVIS.—In our last we gave the state of the case in this town May 4, involving a state of darkness and gasless discomfort, among other things; but the sequel of the affair was crowded out. It was further announced May 8, that

"The Board of Justices, yielding to the appeals of the business community, have ordered the street lamps to be lighted to-night, and the re-installment of the night police. This breaks the dead-lock. Private watchmen have been employed by certain of the business men since Tuesday last, but the feeling throughout the place was one of great insecurity and uneasiness. The Board has made many friends by its action, and there is no fear in Port Jervis that the result of the late election will ever be repeated."

YONKERS.—May 19, a bill regulating the Yonkers gas companies directing them to manufacture gas of sixteen-candle power passed the Senate at Albany on this day.

PEEKSKILL.—The question of lighting Peekskill with gas, naphtha, or oil has been decided in favor of gas by the casting vote of the president of the Board of Village Trustees.

LONG ISLAND CITY.—The Long Island Gas-Light Company of Hunter's Point has been reorganized under the title of "Citizens' Gas-Light Company," and have erected new works at Ravenswood.

GUTTENBERG, N. J.—The principal gas in this place hitherto has been carbonic acid gas, in a vehicle of *Infusum Quassiae Alcoholisatum* (*vulgariter*, lager-

beer). The introduction of coal-gas and civilization is now contemplated.

JERSEY CITY TROUBLES.—These we have before noticed. From the numerous items on the subject that lie before us, we now select the following, from the Jersey City *Journal* of May 17;

"The gas companies have yielded to the pressure brought to bear upon them, and have consented to reduce the price of gas for street lamps from $62.25 per year per lamp to $46.25. But there is to be a corresponding decrease in the size of the light. Now five feet per hour are burned in each lamp, and under the new rule but three and a half will be consumed. The companies claim, however, that the change will decrease the sale of gas $30,000 and their profits $12,000."

In another place we find, in the proceedings of the "Police Board" the fellowing, containing important information;

"The President, Marinus, said that this reduction will enable the committee to supply Greenville with the light so much needed there. At this point Mr. Brigham inquired whether the gas companies bound themselves to continue the reduction. Mr. Edmondson said that he had forgotten to mention that the gas companies refuse to make a new contract, but will send in their bills as usual, and make the necessary reductions, thus reserving to themselves the right to avail themselves of the terms of their original contract."

It is further stated that for the new 3½ foot burners, of which a large number has been ordered, $8 per gross is to be paid. June 1st they are to come first into play.

BIG THING (?)— The following item has been travelling round the world several times, more or less, during a long period;

"London now claims to possess the largest gas meter in the world. Its capacity is stated to be the enormous quantity of 150,000 cubic feet of gas per hour, and its measuring drum delivers for each revolution 1,600 feet."

What we want to know is—is this thus? Such a drum would be, say 10 feet diameter by 20 feet in length, or 12 feet diameter by 14 feet long. We have not kept track of the statistics of station meters, but if there is none bigger than these figures, we would like to know it.

Water-Supply Items.

ALBANY.—The New York Legislature has been trying to do a good deal of water-legislation this Spring. Our notes give us the following, in addition to previous points:

APRIL 28. Senate. Amendment to act supplying the town of Owego with water; passed. Also passed, supplementary act to supply the town of Binghampton with water.

APRIL 29. Assembly passed act in relation to the care, custody and management of the Rochester water works: also, amendments in relation to the storage of combustible materials in New York, and providing for the proper storags of oil: also, a bill extending Croton water into the new wards of New York.

APRIL 30. Assembly passed bill to legalize acts of boards of health in towns of Kings County.

MAY 3. It was announced that Colonel A. C. Davis, Mr. Backhouse and a number of Brooklyn property owners would appear before the Governor to protest against the appropriation to complete the Hempstead Reservoir, and about the same timethe bill came before the Governor for his consideration. It is said to be very brief in its provisions, but long enough to demand of the taxpayers an issue of Brooklyn City bonds, to the amount of $500,000, for which sum, or less, the contractors must stipulate to complete the work. Judging from previous experience such stipulation will be of little value.

MAY 5. The Assembly acts in relation to the new wards of New York City, providing for a water-supply and the appointment of Marshals were favorably reported this day in the Senate.

MAY 8. It was announced that Gov. Tilden had signed the following bills:

In relation to the improvement of the Croton Aqueduct in the city of New York.

To repeal the act to authorize the drainage of marsh lands passed April 12, 1869, and for the repayment to the Marsh Land Company of moneys paid by them into the treasury of the State.

Amending the act to provide for the further supply of the city of Brooklyn with water, and for the payment of the expense thereof.

The last is presumably the Hempstead Reservoir bill.

MAY 10. The Assembly passed bills to amend the Brooklyn sewage and drainage laws.

The bills drawn by Comptroller Green, including one before noticed by us, which proposed to place the whole Croton water supervision in the hands of one official, were amended to death in the Assembly, May seventh.

MAY 12, the Assembly passed an amendment to the act providing pure and wholesome water for the city of New York, which requires the concurrence of the Mayor and Common Council to make extensions.

MAY 13. The Senate passed the Rochester Water Works bill, with an amendment authorizing an increase of the city bonded debt, by $300,000.

MAY 17. The same body authorized Buffalo to obtain a better water-supply.

MAY 19. They recalled the Rochester Water Works act and the issue of city bonds authorized under it was reduced to $181,000.

They also passed an amendment to the Flushing Water act.

MAY 20. The same body passed an amendment supplementing and amending the several acts relating to the water supply of Long Island city.

BROOKLYN—THE HEMPSTEAD RESERVOIR JOB.—May 22. The members of the Brooklyn Board of City Works visited the Hempstead Reservoir, and made a thorough inspection of the works. A meeting of citizens, opposed to spending $500,000 more on this work at the present time, was held in the Common Council Chambers May 25. It is claimed that an additional reservoir is not needed.

May 24. The Board of Aldermen broke up in confusion, without even listening to the following important communication on the subject:

"DEPARTMENT OF CITY WORKS,
"BROOKLYN, May 24, 1875.

"*To the Honorable the Common Council:*

"Gentlemen: The Board of City Works, in compliance with the resolution of your honorable body of the 17th inst,, respectfully submit the following:

"The plans for the completion of ths Hempstead Reservoir are essentially the same as those originally made for the contract for consteueting the same, which are now presented to your honorable body.

"The specifications of the work proposed to be done are embraced in that contract, of which a copy is printed in the minutes of the proceedings of the Common Council on February 15, 1875, and will be found on page 559 and following, of the printed volume.

"The estimates for the completion of the work according to the prices fixed in the contract, and the amount of work es estimated by the city engineer, are as follows, for dam, gates, gate-houses, paving, etc., etc.

Gravel on face of dam	$7,147.00
Srone paving	19,908.00
Gate-house and iron roof	1,000.00
Coping	4,360.00
Roofing to two small gate-houses and gates	750-00
Iron ladders to manholes	75.00
Covering to top of dam	100.00
Total	$33,340.00
Excavation 638,837 cubic yards at 55 cents per yard	350,040.00
Fencing 22,000 feet and completion of road around the Reservoir	8,000.00
Engineering, inspection, etc	7,000.00
Making a total of	$394,380.35

"In regard to the last item the work is performed by the employes of this department, and, while they are engaged upon it, no charge is made against the water maintenance fund.

"Respectfully submitted,
"LORIN PALMER, President."

SAN FRANCISCO.—The city of San Francisco is moving in the matter of water supply, and various propositions are made to meet the demand for more water. The present supply is about 10,000,000 gallons per day. Five different companies have each offered to erect works which will give the city about 70,000,000 gallons daily, at a cost of about $10,000,000. If only one of the five were offered the emergency would doubtless be met, but now the difficulty seems to be to decide upon what proposition to accept.

MEMPHIS, TENN., May 20.—The Memphis Water Works were sold at auction to-day for the benefit of the first mortgage bondholders, and were purchased by W. P. Wallace, President of the New York Guaranty and Indemnity Company: Charles Keep, Manager of the Holly Water Works Company, Lockport, N. Y., and William Goodman, Vice-President of the Third National Bank of Cincinnati, each of which institutions held large amounts of the bonds. The price was $270,000, being little more than half the cost of the werks.

UP THE HUDSON.—The Assembly passed a bill appropriating $50,000 to dredge the Hudson between Coxsackie and Troy, as amended by the Senate, requiring the work to be let to the lowest bidder.

TARRYTOWN.—At a special meeting of the Board of Village Trustees of Tarrytown, a Board of Water Commissioners was organized, as follows: Nelson McCutcheon, President; G. Verplanck, Secretary; James W. Scribner, Treasurer.

T. Sterry Hunt and Cheap Fertilizers.

To the Editor of the *World:* Sir—In your journal of the 5th inst., in an editorial on "Cheapening Fertilizers," you refer to a communication made by me nearly two years since to the American Association for the Advancement of Science, at Portland Maine, on the utilization of the pyrites deposits of the Blue Ridge. These I proposed as a source of sulphuric acid with which to convert into fertilizers the phosphates of South Carolina, and for having done so I am charged with ignorance of the practical side of the matter. Now it was precisely because I had had repeated and especial occasions to look at the economical aspect of the question that I ventured to speak as I did. I was aware that for some years a considerable trade had been carried on in pyrites from Vermont, Ontario and Quebec, which was brought to the vicinity of Boston and New York, and there used for the manufacture of sulphuric acid. I was also aware that a large producer of fertilizers had been bringing pyrites from near Richmond in Virginia, to Philadelphia, where it was used with South Carolina phosphates, and I had just then (in July, 1873) been consulted by the manager of a Glasgow Company owning pyrites beds in Canada, who proposed to erect works in Portland itself, where Canadian pyrites and the phosphates from South Carolina should be brought together for the same purpose. I was familiar with various acid-makers in this country who have employed pyrites, and by personal inquiry and correspondence had learned that when sulphur was selling at $40 per ton, a pyrites yielding 42 per cent. was worth $12 a ton as a source of sulphur.

Many of the pyrites beds hitherto opened in the United States have been of inferior quality, burning imperfectly, and much poorer in sulphur than the standard just named, but I believed, and still believe, that with easily accessible beds of a high grade of pyrites or sulphur ore like that of Spain we might compete successfully with Sicilian sulphur, even if this were free of duty. Of this pyrites, which contains a small portion of copper, Great Britain imports and consumes about four hundred thousand tons annually.

The acid from this ore serves for the greater part of her soda and fertilizer manufacture, and having thus utilized the sulphur she extracts from the residue by solution several thousand tons of copper, leaving behind a nearly pure oxyd of iron, which is itself consumed in the puddling and blast furnaces. Surely, in view of these facts, it was a legitimate proposition to make a similar use of the great deposits of pyrites, rich in sulphur and often in copper, which abound in the Blue Ridge in Virginia, North Carolina and Tennessee. Large quantities of these ores are now treated for the manufacture of copper at Ducktown, Tenn., and at Ore Knob, N. C., and many other points in the region are destined to be the seats of an important copper-mining industry. It, therefore, becomes a question how to bring most advantageously those ores which are richest in sulphur in contact with the abundant phosphates of the South Carolina seaboard. The extraction of copper as a secondary product from these ores will enable us to make acid cheaply, and give cheap fertilizers to the cotton-fields of the South.

As to the fear expressed of danger from the possible presence of arsenic, the pyrites deposits in question appear to be not less free from this impurity than the Spanish ores so largely used in Great Britain. The exceeding rarity of arsenical compounds in this region was long ago pointed out as a significant fact by Professor Henry Wurtz, of New York, in a paper on the "Cobalt and Nickel Ores of North and South Carolina," in the *American Journal of Science* for 1859, and this is confirmed by the experience of those who have been familiar with the metallurgical treatment of the pyritous ores of Ducktown and of Ore Knob, already mentioned.

It appears, however, that my real fault in your eyes is a suspected leaning towards Protection, and you have alluded to my "suppressed minor premise and conclusion," that "prohibitory duties" should be put upon Sicilian sulphur to encourage the working of our own deposits. Not being an advocate for Protection I can only say that no consideration of the sort entered into my calculations when I ventured first in the columns of the *Tribune*, and subsequently in a communication to the American Association at Portland to call attention to the importance of working the copper and sulphur ores of the Blue Ridge, and incidentally to their importance as a means of giving us cheaper fertilizers.

T. Sterry Hunt.

Boston, Mass., May 8, 1875.

James B. Neilson, Inventor of the Hot-Blast.

Mr. Jacob Reese sends the following sketch of Neilson to the Pittsburgh *Commercial*:

James Beaumont Neilson was born at Shettleston, a small village near Glasgow, on the 22d of June, 1792. Neilson's parents were poor; his father never made more than sixteen shillings. James's education was confined to reading, writing, and arithmetic, which he obtained at the parish school, and when fourteen years of age he was apprenticed to learn the trade of an engineer. When through his apprenticeship, he was employed by William Taylor, to look after his engines at the coal works of Irvine. In 1817 he was appointed foreman of the Glasgow gas works. While managing the gas works, he established a Workman's Institute for mutual improvement.

In 1825 Mr. James Ewing directed the attention of Neilson to a defect in one of the Muirkirk blast furnaces, situated about half a mile distant from the blowing engines, which was found not to work so well as others which were close to the engine. This was strange indeed, for one furnace was exactly like the other, and their burdens precisely the same. Neilson conceived the idea that friction retarded the passage of the blast in the long pipe, and immediately commenced experimenting in a small way at the gas works. His experiments confirmed his impression, and he then recommended Mr. Ewing to build a fire under the long pipe, because when the blast was warm it would travel faster.

This advice the company would not take, because, they said, "the biggest dunce knows we make the best iron in winter, when the blast is coldest." This gave Neilson a new idea, and he determined to solve the problem whether the temperature of the blast had any effect to hasten or retard combustion.

After exhaustive experiments he was convinced beyond a doubt that increased temperature of the blast would produce more rapid combustion, and in 1828 he filed his application for a patent. Alone he stood battling for his invention. The wisest men laughed at him, because the best blast furnaces in Scotland used ice to cool their blast in summer. At length, however, Mr. Colin Dunlap allowed Neilson to make a trial of his hot blast at the Clyde Iron Works, in return for which Neilson gave Dunlap and his associates seven-tenths of the patent. The trial was successful, and as it made quite a stir, the patents were reissued with improvements in 1831.

What an eventful life? How profitable to mankind? He served his apprenticeship and learned to work, and by careful study learned to think, and reason from effect to cause. With brain and muscle he walked the path, practically demonstrating each hypothetical deduction, from fact to fact, until he perfected his great invention. How many thousand brighter minds have theorized all their lives without profitable reward? Experimental education is what we want, and that is the design of the State in establishing the Mechanics' High School, of Pennsylvania.

Scotch Gas Supply.

From the annual statistics procured by the West of Scotland Association of Gas Managers we are enabled to gather some very interesting information which cannot fail to prove of utility alike to those who manufacture and those who use the commodity. These statistics have just been issued for the year 1874, and this year they possess the additional merit of unusual completeness.

One of the most striking facts disclosed is the extensive, nay, almost universal, consumption of gas in Scotland, compared to what we know to be the case south of the border. Here there is scarcely a town or village, the population of which reaches 500 or more, but has its own independent gas supply, and some instances are given of communities much smaller in number who avail themselves of this advantage. The returns show that in no fewer than two hundred and forty-nine places the inhabitants have their own gas supply—a condition of things highly creditable and almost unique on comparison with other countries in which the population is equal. In fifteen towns it seems the supply is in the hands of the corporation or other local authority, and in other places powers are being sought to have the supply transferred from private proprietors to the authorities mentioned.

In regard to the now vexed question of the price of gas, some welcome facts are also given. The townspeople of Hamilton appear to be the most favorably situated in this respect, for we learn that the consumers are only charged 4s. 2d. per 1000 cubic feet, while the price in Glasgow is 5s. 5d. Although gas is obtained in Hamilton at such a cheap rate, it is of excellent quality, reaching to 28·75 sperm candles. At Aberdeen, where the price is only 5s. per 1000 cubic feet, the illuminating power is upward of 30 candles. There are many places in Scotland where the rate is from 6s. to 12s. per 1000 cubic feet. In several the rate is 13s. 4d.; at Dingwall it is 13s. 8d.; in Fortrose 14.; in Ellon and Fettercairn 15s.; and in Arberlow it is 16s.; the highest price charged in any town or village in Scotland.

We also gather from the returns some information relative to the illuminating power of the gas. With the exception of three places, two of which are in the far north, in no instance is the gas supplied lower than 24 candles illuminating power. In a considerable number of towns, most of them small in size, the consumer has the advantage of 30 candle gas, while at Muirkirk it reaches 33,5 standard sperm candles, and at Corstorphine 34 candles. Perhaps the only points on which the information given is defective is in regard to the cities of Edinburgh and Glasgow, in which latter city, as a matter of fact, the gas averages about 27 candles. We learn, however, that the quantity of gas manufactured annually in Glasgow has increased to 1,604,125,000 cubic feet, while that of Dundee is 326,000,000, Aberdeen 165,000,000. and Paisley 115,000,000.—*Iron.*

Our Bituminous Coals.

During the past nine years we have kept up a continual hammering at all our great manufacturers to get them to adopt the bituminous and semi-bituminous coals as steam generators. We have from time to time, by argument and analysis, clearly shown the advantage that such coals hold over the anthracite coals, and at the same time hinted that a familiarity with their use might serve them a good turn in case of a strike and an emergency like the present. The great manufacturers' fuel of the future is bituminous coal, and it will be but a few years before it will take the lead in the market and monopolize the greatest attention from our coal merchants. Already the trade is assuming large proportions; anthracite coal is destined in time to be used in small quantities and only as a luxury, in consequence of its high price and ultimate scarcity. New developments may from time to time be brought forth, but they can hardly keep pace with the rapid growth of the population. On the other hand the almost universal distribution of bituminous coal and its low price mark it clearly as the future manufacturing fuel of the country. Already we learn of an anthracite coal being used in the far West (price, $18 to $20 per ton) as a luxury. It is also hinted that but a few years will elapse before we find our anthracite coal quoted as a heavy article of export to England and other foreign countries, where they are rapidly beginning to recognize its merits as a house coal in consequence of its beauty and cleanliness.

So we say to manufacturers, educate yourselves into the merits of Cumberland coal as your future fuel, and begin its use to-day, in order to stimulate its production in larger quantities and at low figures.—*Coal and Iron Record.*

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WEDNESDAY, JUNE 2, 1875.

WISHING TO MAKE THIS JOURNAL an organ of intelligent discussion to those of our readers who may wish to gain or give information on the subjects to which its columns are devoted, the publishers solicit letters from all among them who make the study of these subjects a pleasure, or a profession.

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Cincinnati--In the Cincinnati water works investigation the only things of importance learned May 19, were the facts that Johnston, the present Mayor and Snellbaker, Chief of Police, had borrowed money from Kramer, the receiver, and used it eight or nine months.

THE PROCEEDINGS OF THE ASSOCIATION.

In this issue we present a first highly-interesting instalment of the proceedings last month at the Washington meeting. It will no doubt be admitted that we are correct in deferring comment chiefly until the whole is before our readers. We shall now therefore make only some brief reference to what was said regarding the naphtha-gas question. While we share in the disappointment which must have been felt by those members who entertained the expectation of a report from the committee, we are sure that none of the blame attaches to that committee, which Mr. Neal seemed to think might adhere to them. That gentleman's own remarks demonstrated conclusively the position that this Journal has always taken in this and similar causes; and showed that Mr. Neal himself had come strongly to realize, as the result of individual experience, arrived at in the course of the earnest efforts which—to our own personal knowledge—*he did make*, to obtain the data for a satisfactory report, that such data can only be procured, as the result of the systematic and skilled labor of experts who are provided with the special experience and skill required, for sifting the evidence offered by interested parties, and for applying the tests and criteria, which only can lead to reliable data. In other words, professional chemical investigators.

Mr. Neal's committee really should not be called on or expected to do more than to select and authorize the experts to do the work, decide on and specify the scope and character of the investigation, and receive and transmit the results; with such conclusions and suggestions as may be deemed fitting by themselves.

Mr. Cathels, a gentleman trained in a school in which such proceedings have been more familiar; as it would appear, advised Mr. Neal to the same purport as we ourselves; and it seems to us that the latter gentleman in his remarks, intended distinctly to convey that he deemed the services of paid experts necessary to the guidance of the committee in its work. Our surprise was therefore considerable to find that no definite steps were taken by the Association towards the provision of such necessary help.

More we may say on this topic in the fulness of time. Space, if nothing else, is lacking at present.

FURNACE WORKS WITH PETROLEUM.

It is undeniable that the main topics, and the most immediate ones for the columns of this Journal, are the manufacture, distribution and consumption of illuminating gas, from any and every material and with any and every device adaptable thereto. Still, we do not think that intelligent readers of the Journal will claim that we must be pinned down narrowly to this speciality. The uses, economy and handling of *fuel* and the management of furnaces and of fire, are quite appropriate subjects for our space; and this is the more emphatically true when such fuel is of a gaseous nature, and when new facts are to be brought forward that have no indirect or remote bearing upon the science of gas, and the study of the nature and properties of flame and its applications in the useful arts. These are indeed topics which will soon occupy the gas profession itself, in a practical way, much more largely than hitherto.

We owe therefore no apology to our several highly respected contemporaries who occupy those special fields, if we even intrude sometimes into the realms of iron and steel, and tread upon the border land that lies between our own domain and theirs.

These remarks are suggested by some personal observations we have lately had an opportunity to make, upon one of the most successful and suggestive applications of gaseous fuel within our knowledge. Already a year ago reference has been made to some experiments then proceeding at Providence, R. I., and Bridgewater, Mass., by methods of Dr. C. J. Eames, of New York, on the heating of furnaces for operating in various ways on iron, with *petroleum-gas*. The scene of these experiments has been of late transferred to a much nearer and more convenient point, in Jersey City, adjoining the terminus of the Erie Railway. Several visits have been made by us; and complete investigations will soon be reported, accomplished in conjunction with a gentleman of high distinction in the scientific study of iron and steel; which will let complete light into these highly important and successful operations.

At present we shall make therefore only some general statements, of a preliminary kind. The new operation in Jersey City is being carried on at an old and well-known rolling-mill, where there are already two reheating furnaces in working order, that have been in use for some 15 years, with heavy machinery for rolling boiler plate. Dr. Eames's apparatus has been attached to one of these furnaces, and the *waste heat* alone from the furnace, as heated by the petroleum-generator, is found to be more than amply sufficient to get up steam for this massive machinery, in very brief time. We shall defer presenting a description of the invention—which involves features of great novelty, arrived at by study of the chemical principles involved--until necessary cuts are provided, to make all clear. Remarks on the numerous bearings of this invention, and upon its applications to the operation of furnaces for working iron and steel generally, would carry us too far on the present occasion, and will be taken up in a future column. We shall now briefly sum up the matter, by stating that the Eames method and apparatus furnish a flame whose temperature can be maintained uniformly at any desired intensity, however high; producing also any desired degree of oxidizing or reducing power, and having any desired length or volume, to suit all and any purposes that can ever be called for in the metallurgic arts—a flame moreover practically free from all impurities detrimental to fine iron or steel. Some of our authorities on gas-matters believe moreover, that a bench of retorts may be heated to great advantage by this apparatus.

We are authorized by the inventor to state that all gentlemen interested in the subject will be welcome to inspect and examine the apparatus in practical working, at the works in Jersey City, corner of Henderson and 13th Streets, near the Pavonia Ferry.

SOME EXPLANATIONS REGARDING THE HARLEM EXPERIMENTS.

As it is clear that some misapprehension has existed, in several quarters, regarding the bearing and scope of the Editor's Report of some month since, upon the gas of the Harlem Company, before and after passing the St. John and Rockwell Condensers—and more especially as it appears that the learned and accomplished California gas-engineer, Mr. Smedberg, has shared in this misunderstanding—it has been suggested

and appears on consideration quite proper, that some decisive explanation should be presented; to put the subject on its true foundation, and in a fair light before the public.

The misapprehension referred to has probably been a result rather of accident, than of neglect on the part of any one concerned. This Report in question, published in the Journal of January 2, was purposely made as concise as possible, and many details were hence omitted. It was assumed, in the knowledge that there was to be a supplementary statement from the inventor Mr. St. John, that all these details would be laid before the public by that gentleman, probably in a shape more satisfactory to the said public.

Mr. St. John, however, as we must be permitted to think, made, in his subsequent communications of Feb. 2 and April 2 (the latter in rejoinder to Mr. Smedberg) the mistake of attempting to set forth too many ideas at once, and his statements and explanations of these necessary details, were thus in a measure obscured, and their purport lost.

On glancing back at the issue of Jan. 16—that immediately succeeding the one containing the Report—it will be seen that the apparatus there figured, as *the one then working* (at the time of the analyses) has *only two* of the St. John straining-boxes. It was an incomplete apparatus; and in drawing up the Report, its author was under the apprehension that it would be represented and accepted as such; and that under these circumstances the conclusion, which we venture to reproduce below, would be accepted without hesitation. To wit:

"The abstraction from the gas, with so small a degree of refrigeration, and with apparatus of such extreme compactness, of such large percentages of tar, soot and naphthaline as shown by my analyses in Table I, and even of very important proportions of the water and ammonia, cannot but be regarded as a triumph of skill, and a great step in advance in gas-purification.

It was assumed at the time, that all interested readers would know—though *now* it may be well to state it in so many words—that the flow through these two small straining boxes, that is the *make* of the Harlem Company, was some 25,000 feet per hour, or over 400 feet per minute. Passing on a little further, to the issue of Feb. 2, we there find the supplementary article spoken of, from Mr. St. John; with a cut of more complete apparatus—which has, however, been still further improved on since by the inventor—and Mr. St. J. states below "We propose to use *four boxes*, as shown above" (the italics are ours). His object in doubling the number which the analyses showed to be all-sufficient to strain out practically all the tar and naphthaline, being to operate further on the ammonia, carbonic acid, and sulphuretted hydrogen; as we have interpreted his argument.

Moreover, in reference to the passage quoted by Mr. Smedberg in his last letter, dated April 15—in Journal of May 17—

"The reason why a series of boxes is constructed, is not for the purpose of extracting tar or naphthaline, but to apply the solvent properties of the water in combination that is not exhausted in the first box, in order to arrest the last vestige of the *ammonia*."—

if that gentleman will refer back to the paragraph from which he quotes this, he will observe that the "series of boxes" spoken of is a series of "four boxes." The practical deduction we would have to be drawn from all this, is that it is not fair to regard the figures given in the report, with reference to the impurities soluble in water, as a criterion. The quadruplex boxes which Mr. St. John desires to employ, must, we think, tell a much better tale. When they are ready, either at Harlem, or at one of the several works which are about adopting them, we feel sure that we shall have this better tale to tell.

In the meantime, we have to announce that as a temporary expedient, to supply as far as may be, the deficiency or incompleteness of this Harlem apparatus, they have there adopted recently the plan of pumping up the ammoniacal liquor, from a supplementary box attached to the straining boxes (a sort of Separator, in which tar is allowed to settle from the liquor—an arrangement too simple to require any explanation) and showering it down through the gas, in each of the upright columns of the dry scrubber shown in the figure.

We will also announce that, in order to test the position taken by the inventor, regarding this reiterated action of the liquor on the gas, which is assumed to be equivalent to what will occur in the third and fourth boxes that are to be added—and which are to be *fed with the ammoniacal liquor only*—it is proposed by us *at once* to make some renewed tests at Harlem, with the same analytical apparatus as before, on the gas *between the condensers and the purifiers*, again, as well as on the *gas after purification*; which last was not reported on at the previous occasion. The results of these renewed analyses, it is hoped, will be ready—accidents apart—for communication to our readers in our next issue; when we shall have space also for some further remarks from Mr. St. John himself: excluded this time by the crowded state of our columns.

We would add that we have, by invitation, inspected some new drawings and specifications, of the *complete* apparatus, with the four boxes, as it is to be finally set up at Harlem, and at several other works throughout the country; and are enabled to state many new features and beautiful additional improvements are included in these, which, in our belief, will prove of great general interest. We may add that the Harlem Company and the St. John and Rockwell Company join in a cordial and respectful invitation to Mr. Smedberg and the gas-profession generally, to inspect the operations at Harlem, together with the drawings referred to.

The above paragraphs have been called out from us by a communication from the inventor; whose feeling that some further explanation of the Report was due from us, and to himself—in view of the imperfect understanding of the case that seems to have resulted—we fully coincide with.

☞ We are promised a full illustrated article upon the Pelouze & Audouin Condenser, a preliminary advertisement of which will be found in another column.

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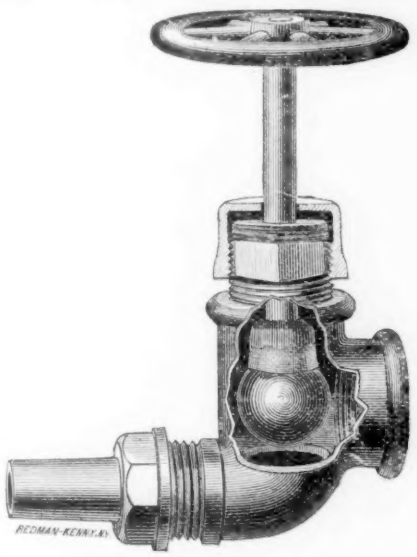

This valve is made of malleable iron, and is specially adapted to encounter the heat of burning buildings, in which the ordinary meter cock (made of brass) will crumble or melt. It is opened or shut with ease, by sliding the stem up or down, the latter being held where desired by the friction of the packing. It is perfectly tight, and is not so liable to get out of order as the meter cock: its cost being about the same.

The great advantage of this valve is, that in case of fire—when the gas cannot be shut off by hand, the heat will automatically close the valve, and thereby stop the flow of gas. The certainty of its action in this way will be at once apparent when it is observed that the valve proper is a round iron ball, attached with a soft solder composition (melting at 250°) to the end of the stem, and held directly over the seat. The heat of the fire, melting the solder, releases the ball, which drops into the seat, and shuts off the gas.

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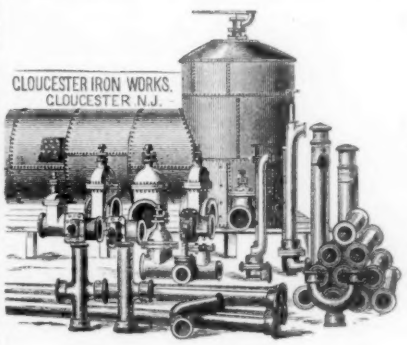

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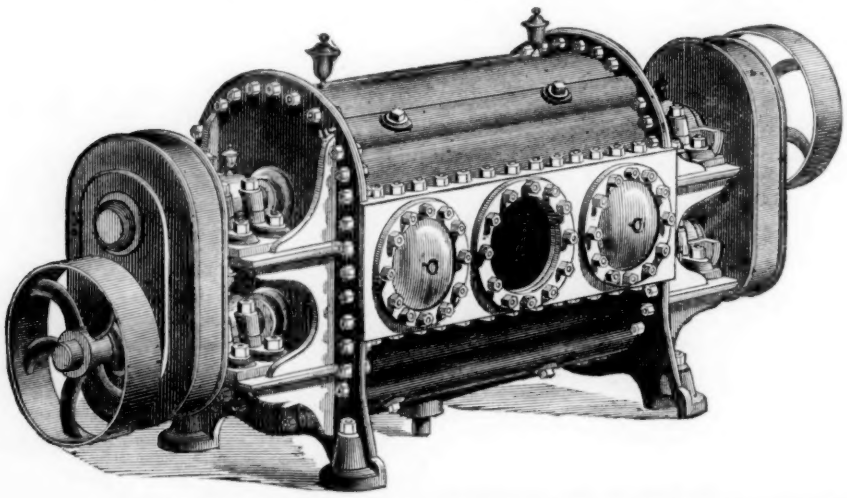

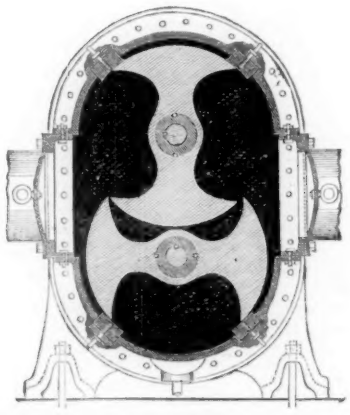

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Cheltenham Fire Brick and Clay Retort Works—Evens & Howard, 916 Market street, St. Louis, Mo.
Jersey City Fire Brick Works—J. H. Gautier & Co., Greene, Essex and Bergen sts., Morris Canal Basin, N. J. 8
Manhattan Clay Retort Works, 15th st., near Av. C, N. Y. 8
Philadelphia Fire Brick Works, Vine and 23d sts., Phila. 8
Retorts, Etc.—Geo. C. Hicks & Co., Baltimore Md. 6

LAMPS, STOVES, PETROLEUM, ETC.

Patent Lamp Post—J. W. Graham, Chillicothe, Ohio, or A. M. Callender, office of this Journal. 9

MISCELLANEOUS.

Analysis and Testing of Gas Coals—Prof. Henry Wurtz, 12 Hudson Torrace, Hoboken, N. J. 10
Architect and General Gas Engineer—William Farmer, 111 Broadway Room 95. 5
American Gas Works Construction and Supply Company—61 Broadway, N. Y. 3
Cements—S. L. Merchant & Company, 76 South st., N. Y.
Contractors for Gas Works, Etc.—Murray & Baker, Fort Wayne, Ind. 2
Fodell's System of Bookeeping—A. M. Callender & Co., 42 Pine st., New York. 1
Gas Engineer—B. E. Cholar, 914 Olive St., St. Louis, Mo.
Gear Wheels—Scott, 98 Chambers St., N. Y. 5
Gas-Light Company of America, 63 and 64 Drexel Building, New York. 2
Kidd's Gas Consumers Guide—A. M. Callender & Co., 42 Pine Street, N. Y.
Massachusetts Institute of Technology—Samuel Kneeland Boston, Mass.
National Coal Gas Company—H. P. Allen, 4 Warren street New York. 6
Retort Setting and Working—E. S. Cathels, Montreal, Can. 8
School of Mines, Columbia College, East 49th st. 9
Screening Shovels—O. R. Butler, 126 Maiden Lane, N. J. 7
Scientific and Practical Chemist and Geologist—Profetsor Henry Wurtz, 12 Hudson Terrace, N. J.
Screening Shovels—G. W. Dean, 1358 Broadway, N. Y.
Springfield Gas Machine—Corner Canal and Centre St.
Slade's Automatic Fire Governor—Jas. Slade, Gas Works, Yonkers, N. Y.
Scotch Fire Brick—S. L. Merchant & Co., 76 South Street, corner Maiden Lane, N. Y.
Works upon Gas—D. Van Nostrand, 23 Murray street and 27 Warren street, N. Y. 9

THE DESPARD COAL COMPANY

OFFER THEIR SUPERIOR

DESPARD COAL

To Gas Light Companies throughout the country.

Agents, PARMELEE BROTHERS, No. 32 Pine street, N. Y.

BANGS & HORTON, No. 31 Duane street, Boston.
Mines in Harrison County, West Virginia.
Wharves Locust Point, } Baltimore.
Company's Office, 29 South street, }

Among the consumers of Despard Coal, we name: Manhattan Gas Light Company, New York; Metropolitan Gas Light Company, New York; Jersey City Gas Light Company, N. J.; Washington Gas Light Company; Portland Gas Light Company, Maine.

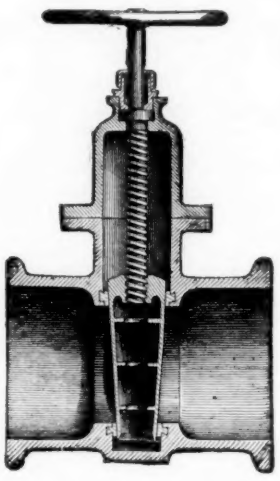
*** Reference to them is requested. 204-1y

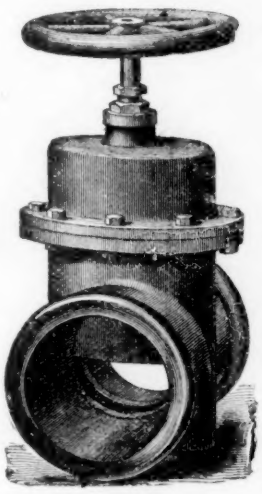
CHAPMAN VALVE MANUFACTURING CO.

MANUFACTURERS OF

CHAPMAN GAS VALVES.

Office and Sales Room 75 and 77 Kilby Street, Boston.





These Valves have been in use for several years, and are pronounced by all who have used them to be

The Best Gas Valves Ever Made.

They afford a direct passage the full size of the pipe. The seats are made of an alloy similar to BABBITT metal, specially prepared for the purpose, and superior to all other metals used for the seats of Gas Valves. It does not corrode under any circumstances to which it is exposed.

There is no LIABILITY OF COHESION between the Gate and Seat, and the Valves can be relied upon to SHUT TIGHT and OPEN EASILY at all times—an important desideratum when used for street mains, in cases of fire.

We refer to the following named Gas-Light Companies among the many that have used these Valves:

BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CAMBRIDGE GAS-LIGHT COMPANY, CAMBRIDGE, MASS.
NEWTON & WATERTOWN GAS-LIGHT CO., WATERTOWN, MASS.
LAWRENCE GAS-LIGHT COMPANY, LAWRENCE, MASS.
PEOPLES GAS-LIGHT COMPANY, BROOKLYN, N. Y.
CITIZENS GAS-LIGHT COMPANY, BROOKLYN, N. Y.
SOUTH BOSTON GAS-LIGHT COMPANY, BOSTON, MASS.
CHARLESTOWN GAS-LIGHT CO., CHARLESTOWN, MASS.
LYNN GAS-LIGHT COMPANY, LYNN, MASS.
FITCHBURG GAS-LIGHT COMPANY, FITCHBURG, MASS.
CITIZENS GAS-LIGHT COMPANY, NEWARK, N. J.
WILLIAMSBURGH GAS-LIGHT CO., WIRLIAMSBURGH, N. Y.

GAS AND WATER VALVES ½ INCH TO 36 INCHES DIAMETER.
STEAM VALVES ½ INCH TO 12 INCHES DIAMETER.
357-tf

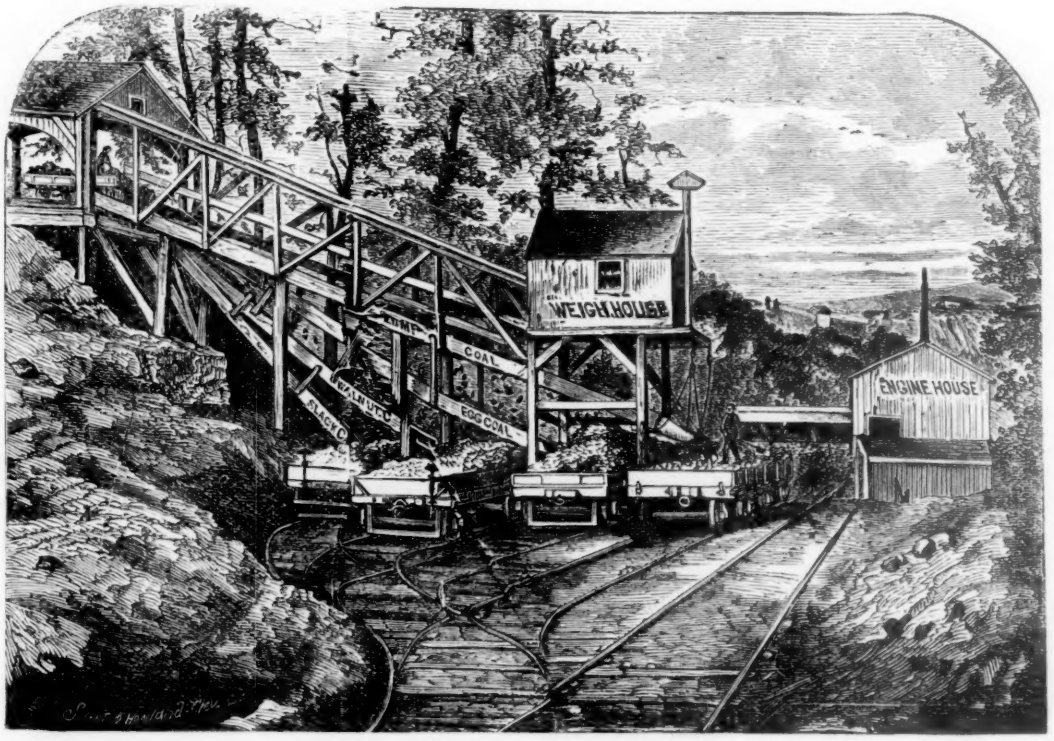
FREEMAN BUTTS COAL ASSOCIATION.

(LIMITED.)

CLEVELAND, OHIO,

CELEBRATED GENUINE STERLING COAL.

American Cannel. Pittsburg and other Gas Coals.



Testimonials.

From Manhattan Gas-Light Co., N. Y.

Yours of the 9th inst. is received. The "Sterling Coal" received from you during the past year worked very satisfactory—averaging 9,500 cubic feet of 15 candle gas per ton of 2,240 lbs., and 41 bushels of coke weighing 1465 lbs. We consider it among the best American Gas Coals for the quantity and quality of the gas produced, and also for the excellent quality of the coke.

I am, gentlemen, your obedient servant.

CHARLES ROOME, Pres't.

From Buffalo Gas-Light Co., Buffalo, N. Y.

The Sterling Coal we have had from you we find to be an excellent gas coal. The yield of both gas and coke is good. The illuminating power of the gas is high and the quality of the coke is very good.

ROBERT ROBSON, Foreman Gas Works.

From Citizens Gas-Light Co.

ROCHESTER, N. Y., Sept. 2, 1874.

Your favor September 2nd at hand. Yield Sterling Coal to date from July 19, 4·70.

Respectfully yours,

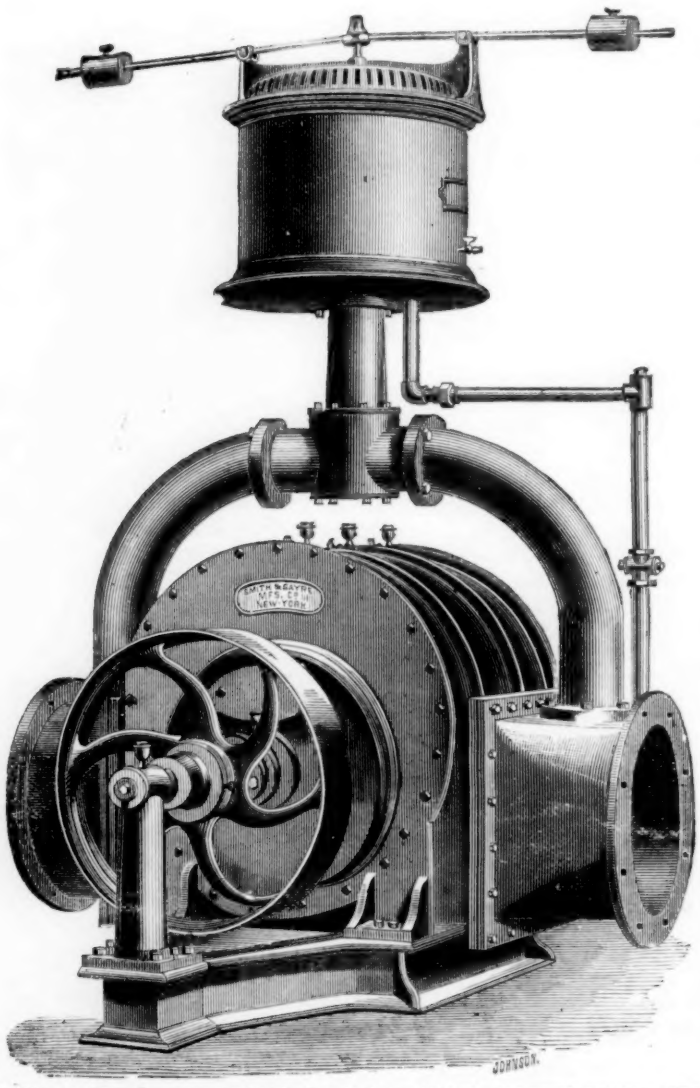
WM. H. WARD, Sec.

Would also refer to the Gas Companies in the following places: New York City (Manhattan and New York Cos), Brooklyn, Albany, Troy, West Troy, Buffalo, Rochester, Oswego, Ogdensburg, Lansingburgh, Newburgh, Rome, Palmyra, Geneva, Yonkers, Rondout, Kingston, Albion, Brockport, Seneca Falls, Elmira and Lyons in State of New York; Cleveland, Toledo, Sandusky, Norwalk, Oberlin, Salem and Fremont in Ohio; Detroit, Ann Arbor, Grand Rapids, Kalamazoo, Jackson and Adrian, in Michigan; Toronto, Hamilton and Coburg in Canada; Chicago, Ill., and two companies in Milwaukee, Wis.

SMITH & SAYRE MANUFACTURING COMPANY.

The Mackenzie Patent Gas Exhauster

And Patent Compensator.



They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-jo ints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

MACKENZIE PATENT BLOWER, PATENT CUPOLA AND SMELTING FURNACE.

The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary fan. The Cupolas are manufactured in sizes to melt from 1 to 20 tons per hour, will save one quarter of the time required by the old style Cupola and 33 per cent fuel. Address

G. G. PORTER, President.
JAMES M. SAYRE, Treasurer.
CHARLES W. ISBELL, Secretary.
OFFICE, 96 LIBERTY STREET, New York.

PRICES OF FOREIGN AND DOMESTIC GAS COALS.

[Reported Expressly for this Journal.]

MAY 16, 1875.

DELIVERED IN NEW YORK.

English Cannel.			
Ince Hall	$17 00	@	18 00
Kirkless Hall	16 50	@	17 00
English Caking Coals.			
Newcastle Gas	$12 00	@	00 00
Liverpool caking	11 50	@	12 00
British Province Coals.			
Pictou	2 50		
Block House—At Mines, $2 12, Gold	0 00		
Caledonia—At Mines, $2 00, Gold	0 00		
Little Glace Bay—At Mines, 1 87½, Gold	2 00		
Lingan—At Mines, $2 25, Gold	0 00		
Sydney—Old Mine	3 00		
" Reserve Mine	2 2		
" International	— —		

(Duty, 75 cents per ton, gold. Freight to New York $2 25 currency. Cost of above coals delivered in New York, $5 25 @ $6 00½, currency.)

Pennsylvania Coals.			
Penn Gas Coal—At Amooy	$7 00	@	0 00
Westmoreland—At Amboy	7 00	@	0 00
(In New York both the above coals $7 50)			
Shafton	7 50	@	0 00
Youghiogheny	7 75	@	0 00
West Virginia Coals.			
MurphyRun	$7 40	@	0 00
Despard	7 40	@	0 00
West Fairmont	7 40	@	0 00
American Gas Coal	7 40	@	0 00
Fairmont	7 40	@	0 00
Newburgh Orrel	7 40	@	0 00
Pinnickinick	7 40	@	0 00
Cloverhill of Virginia	6 00	@	6 50
McKenzie Compound Mixture			— —
American Cannel Coals.			
Peytona of West Virginia	$12 50	@	00 00
Darlington of Pennsylvania			— —
Cannelton Cannel			12 50
Red Bank—at Philadelphia			7 60
" —at South Amboy			9 00
Asphalts.			
Albertite of New Brunswick	$— 00	@	— 00
Ritchie Mineral of West Virginia	18 00	at	Balt'e.
Trinidad Bitumen	— —	@	14 05

The Waverly Coal and Coke Company of Pittsburgh, have contracted with the Pittsburgh Gas-Light Co. for 40,000 tons of their Youghiogheny coal, oh private terms,

SLADE'S
AUTOMATIC FIRE GOVERNOR.

PATENTED AUGUST 4, 1874.

It regulates the speed of Exhausters by controlling the fire. The least pressure on the Retorts opens the Damper in the Boiler Chimney and under the fire, and closes them as soon as the pressure is removed. Saves the boiler, fuel, and all attention, except to supply the fire. Come and see it, or address

JAMES SLADE,
Gas Works, Yonkers, N. Y.

Gas Engineers,

AND PARTIES ENGAGED IN THE BUILDING OF

GAS WORKS,

who desire information regarding PETROLEUM GAS, either or use pure, or for enriching, are requested to address, sta ting particulars.

J. D. PATTON,
363-unl Treverton, Northumberland Co. Pa.

To the Profession.

A YOUNG MAN OF LIBERAL EDUCATION, WHO HAS spent many years in the study of gas, and working in a arge gas works, desires a situation as Superintendent of a works making 10,000 to 50,000 cubic feet daily. Has good reference as to ability; or would act as Assistant in large works. Would prefer a situation on the staff of a gas works nilder—draws well, and has experience in setting up appar-

Address, stating salary, C. P. V., care of W. B. CAR- & Co., Cincinnati, Ohio. 372

P.P. DEILY, J. FOWLER.

1842. *1874.*

DEILY & FOWLER,

39 LAUREL STREET, PHILADELPHIA, PA.,

Builders of Gas Works.

MANUFACTURERS OF

GAS-HOLDERS,

Single and Telescopic.

WROUGHT IRON ROOF FRAMES,

COAL WAGONS,

COKE BARROWS,

AND ALL

Wrought Iron Work

CONNECTED WITH GAS WORKS.

☞ Particular attention paid to Extensions and Repairs.

MASSACHUSETTS

INSTITUTE OF TECHNOLOGY.

Entrance Examinations June 1 and 2, and Sept 23 and 24. For new Catalogue and late Entrance Examination Papers apply to

PROF. SAMUEL KNEELAND,
255-12t Secretary, Boston, Mass.

MECHANICAL & GAS ENGINEER.

To Gas-Light Co's.

The undersigned respectfully announces his voluntary resignation of the Vice-Presidency of the American Meter Company, from the 1st of March last, after filling that position from its organization in 1863, and now offers his services as

Consulting or Constructing Engineer,

in the erection of new, or the extension of Gas Works.

He is prepared to furnish plans and Specifications, embracing all the latest improvements in the MANUFACTURE OF COAL GAS, at short notice, and on reasonable terms. His experience of THIRTY YEARS in the construction of Gas and Water Works, Railroads, Tunneling, etc., enables him to refer with confidence to any of the Works erected by him, as a guarantee of satisfaction and ability.

By arrangements with reliable manufacturers of all MATERIAL and SUPPLIES used by Gas Companies, he is prepared to furnish promptly all such orders, with best selections, and to give satisfaction as to prices, terms, etc., and respectfully solicits a share of patronage.

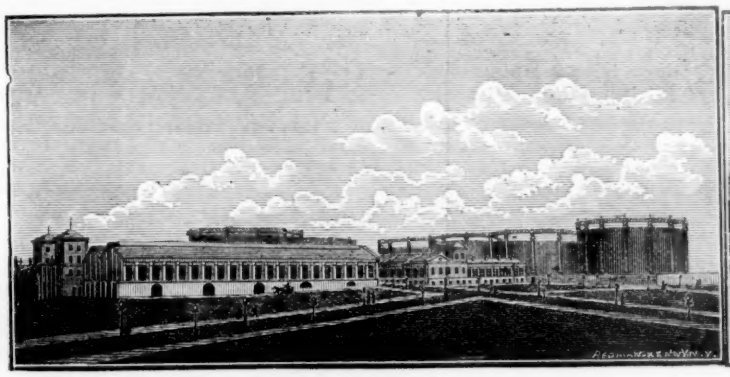
HENRY CARTWRIGHT, Gas Engineer,
2107 GREEN STREET, PHILADELPHIA. 379-6t

KIDD'S
Gas Consumers' Guide

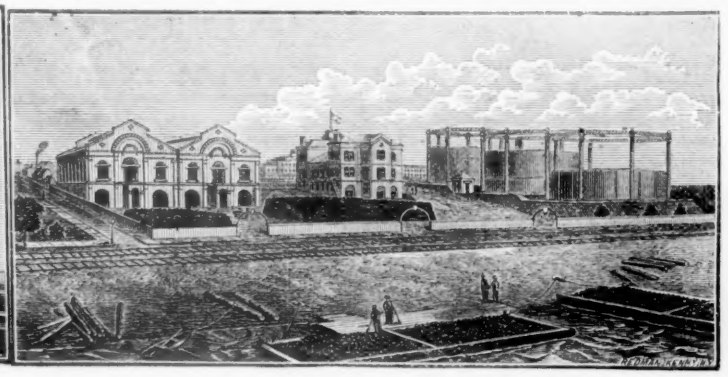
Enables every Gas Consumer to ascertain at a glance, without any previous knowledge of the Gas Meter, the quantity and money value of the Gas consumed. Also the best method of obtaining from Gas the largest amount of its light.

It will be to the advantage of Gas Companies to supply their Consumers with one of these Guides, as a means of preventing complaints arising from their want of knowledge in regard to the registration of their meters. For sale by

A. M. CALLENDER & CO.,
42 Pine Street, New York, Room 18,



CINCINNATI GAS WORKS. ERECTED 1871-72-73.—WM FARMER, ENG.



LACLEDE GAS WORKS, ERECTED 1872.—WM. FARMER, ENG

WILLIAM FARMER,

ARCHITECT AND GENERAL GAS ENGINEER,

111 BROADWAY, TRINITY BUILDING, Room 95, New York.

WILLIAM FARMER may be consulted upon all matters connected with the construction of GAS WORKS, or any other description of buildings Will furnish General and Detail Drawings, Specifications and Estimates for Gas Works of any capacity.

PATENTEE OF THE FOLLOWING INVENTIONS:

Exhausters for Gas and Foul Lime Ventilation,
Dumping Barrows for Coal, Coke and Lime,
Hydraulic Mains for Retort Benches,
Blowers for Forges, Foundries, &c.
Pumps for Water, &c., &c.

REFERENCES:

Professor SILLIMAN, New Haven, Conn.
GEN. CHAS. ROOME, President Manhattan Gas-Light Company, N. Y.
A. W. BENSON, President Brooklyn Gas-Light Company, Brooklyn, N. Y.
W. W. SCARBOROUGH, President Cincinnati Gas-Light Company, Cincinnati, Ohio.
S. L. HUSTED, President Laclede Gas-Light Company, St. Louis, Mo.
Prof. HENRY WURTZ, Editor AMERICAN GAS-LIGHT JOURNAL, N. Y.
GEN. A. HICKENLOOPER, Vice-President Cincinnati Gas-Light Co., Cincinnati, Ohio
FREDERICK CROMWELL, Vice-President Laclede Gas-Light Company. St. Louis Mo.
C. VANDERVOORT SMITH, Engineer Manhattan Gas-Light Company, N. Y.
JAMES R. SMEDBERG, Consulting Engineer, San Francisco Gas-Light Co., Cal.

PATENT FOR SALE.

To Fire Clay Retort Manufacturers.

W. D. CLIFF, of the firm of JOSEPH CLIFF & SON, Wortley, Leeds, England, has recently obtained Letters Patent for the making of CLAY RETORTS by machinery. Besides being made cheaper, they are also made much better than by hand. They are regular and equal in their thickness, and in their length are true and straight throughout, being in all respects far better and handsomer than hand made Retorts. The fact that Messrs. Cliff & Son have for many years been very largely engaged in the making of Clay Retorts will be a sufficient guarantee as to value of the patents. The patentee is wishful to sell the patent right for America. It is No. 55,069, and is for seventeen years from the 15th day of September, 1874.

All particulars may be learned on application to

W. D. CLIFF,
Wortley, near Leeds, England.

580-6t

B. S, BENSON.

MANUFACTURER OF

Cast Iron Pipes and Fittings,

AND

Gas and Water Mains.

All sizes from 3 to 30 inch cast vertically in 12½ feet lengths

Office & Factory 52 East Monument St.,

BALTIMORE, MD.

$30 per Dozen.

DEAN'S

NEW PATENT (1873)

Screening Scoop SHOVEL

FOR COKE, COAL, ASHES, AND OTHER SUBSTANCES.

The frames are 12 by 18 inches, with seven bars, and are made of the best malleable Iron. They can be wired between bars by an arrangement of holes a quarter of an inch apart, by an ordinary person, to screen any size substance desired. They are warranted to be the most durable and practical Screening Shovel made, or money refunded.

Reference—All New York Gas Companies and Hotels.

Price, $30 per Dozen.

Sample sent gratis to any Company, if desired.

☞ Smaller sizes on hand. Please address orders to A. SEE & SON,
N. Y. Shovel Works, No. 1358 B'way, N. Y

FOR SALE.

On or about May 1st, 1875,

One 8 Ft. STATION METER

complete, of American Meter Company's make, with a capacity of four hundred thousand cubic feet per day.

For price and any other information address

H. STACEY, Eng'r and Sup't
Indianapolis Gas-Light and Coke Co.,
Indianapolis, Ind.

375-6t

JESSE W STARR & SONS,

Camden Iron Works

Camden, New Jersey,

MANUFACTURERS OF

ALL KINDS OF CASTINGS AND APPARATUS FOR GAS WORKS,

Wrought Iron Roof Frames,

For Retort and other houses Retorts and all castings required for setting them in the latest and most improved model. WASHERS, CONDENSERS, SCRUBBERS and EXHAUSTERS for relieving the Retorts from pressure. PURIFIERS, varying from 2,000 to 2,000,000 cubic feet daily purifying capacity.

Wrought Iron Lime Sieves

for Purifiers. Station Meters of all sizes.

GAS HOLDERS,

TELESCOPIC AND SINGLE,

With cast iron guide and suspension frames. GAS ERNORS or REGULATORS, STREET MAINS, from 1½ 48 INCHES DIAMETER, for WATER or GAS. Street Main connections, such as BRANCHES, BENDS, DRIPS, SIEVES, etc.

STOP VALVES, from 3 to 30 inches, for both Water and Gas.

Wrought Iron Work.

All the Smith and Sheet Iron work required in and about Gas Works. 226-tf

JESSE W. STARR. BENJ. A. STARR. BENJ. F. ARCHER

B. E. CHOLLAR,

GAS ENGINEER,

914 OLIVE STREET, ST. LOUIS, MO,

358-

THE

PENN GAS COAL COMPANY

OFFER THEIR

COAL, CAREFULLY SCREENED,

AND PREPARED FOR

GAS PURPOSES.

Their Property is located in the Youghiogheny Coal Basin, near Irwin's and Penn Station the Pennsylvania Railroad, and on the Youghiogheny River.

OFFICES

No. 11 Merchants Exchange, Phil'a. 90 Wall Street, New York.

PLACES OF SHIPMENT.

Pennsylvania Railroad, Pier No. 2 (Lower Side).
Greenwich Wharves, Delaware River.
366-1y **Pier No. 1 (Lower Side), South Amboy, N. J.**

CANNELTON COAL CO.

OF WEST VIRGINIA.

Offer for sale the following Coals, from their Colliery at CANNELTON, Kanawha County, West Virginia, delivered at RICHMOND, Va.:

CANNELTON CANNEL.

acknowledged to be the most valuable ENRICHER produced in this country, a gross ton yielding 10,000 cubic feet of GAS of 64·54 CANDLE POWER; COKE 32 bushels, of good quality.

CANNELTON SPLINT.

a SEMI-CANNEL of an excellent quality, a gross ton producing 9,500 cubic feet of Gas of 20 CANDLE POWER; COKE. 30 Bushels, fair quality.

CANNELTON CAKING COAL.

Recent experiments made with this Coal have established the fact that the Kanawha Valley can furnish GAS COAL equal to those produced from any other section of the country; that mined by the Cannelton Co. yielding from the gross ton 10,000 cubic feet of Gas of 16 CANDLE POWER 35 bushels of COKE of *superior quality*—only *one* per cent. of *sulphur*.

SAMPLE CARGOES shipped to any required point, on application to the undersigned, from whom full information can be obtained.

SALES AGENTS { **J. TATNALL LEA,** Treasurer, P. O. Box 1747 Philadelphia.
PERKINS & JOB, 27 South Street, N. Y.; 91 State Street, Boston.
H. W. BENEDICT & SON, New Haven.

ARCHER & PANCOAST MAN'G CO.

DESIGNERS AND MANUFACTURERS OF ARTISTIC

GAS FIXTURES,

AND IMPORTERS OF

FRENCH BRONZES & CRYSTAL CHANDELIERS.

67 Greene Street, 68, 70, 72 Wooster St. } Above Broome. **New York.**

RILEY A. BRICK & CO.,

MANUFACTURERS OF

CAST IRON PIPES,

FOR WATER AND GAS,

ALSO,

AS WORKS AND MACHINERY CASTINGS

OF EVERY DESCRIPTION,

No. 112 Leonard Street, New York.

RILEY A. BRICK. JAS L. ROBERTSON

TYRCONNELL GAS COAL.,

MINED IN TAYLOR COUNTY, WEST VA.

Company's Office, 52 S. Gay St., Baltimore.

CHARLES MACKALL, Secretary.

CHARLES W. HAYS, Agent, Room 7, 111 B'way, N. Y.

SHIPPING POINT—Baltimore, Md.

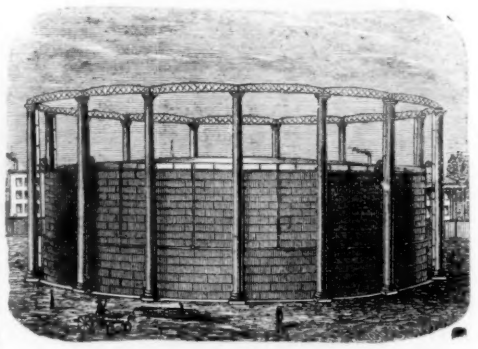
This coal yields 10,000 cubic feet of Gas, with an illuminating power of over 16 candles. Forty bushels of very superio Coke, with little Ash, and scarcely any clinker. 304-1y

T. F. ROWLAND,

Continental Works,

GREENPOINT, BROOKLYN, N. Y.

ENGINEER, AND MANUFACTURERS OF



GAS-HOLDERS

OF ANY MAGNITUDE,

Condensers, Scrubbers, Purifiers, Retorts, Hydraulic Mains and all other articles connected with the Manufacture and Distribution of Gas, furnished with despatch. Plans and Specifications prepared, and Proposals given for the necessary Plans for Lighting Cities, Towns, Mansions, and Manufactories.

MONONGAHELA GAS COAL COMP'Y

Of West Virginia.

OFFICE, 56 EXCHANGE PLACE.
(P. O. Box 432.)
BALTIMORE.

Thomas Gemmell, *President.*
A. Robinson, *Vice-President and Treasurer.*
Benjamin Bissell, *Secretary.*

Mines at Wilsonburg, Harrison Co., W. Va Shipping Port, Baltimore.

L. S. BOYER & CO,, GENERAL SALES AGENTS.

The result of use of this coal in *quantity* by several of the largest gas works in the country, is reported as follows, viz. Yield of gas, 10,000 to 10,500 feet per ton of 2,240 lbs.; illuminating power, 16½ to 17½ standard candles; coke, good in quantity and quality. 350-3m

THE NEWBURGH

Orrel Coal Company,

Mines at Newburg, Preston County, W. Va.
Company's Office, No. 52 S. Gay Street, Baltimore, Md.
C. OLIVER O'DONNELL, Pres't. CHAS. MACKALL, Sec'y.
CHAS. W. HAYS, Agent in New York, Room 7, Trinity Building, 111 Broadway.
SINCLAIR & AGNEW, Agents, Alexandria, Va.

This Company offer their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York; the Brooklyn and Citizen's Gas Light Companies of Brooklyn, N. Y.; the Baltimore Gas Light Company of Baltimore, Md., and the Providence Gas Light Company, Providence, R. I.

The best dry coals shipped, and the promptest attention given to orders. 224-1y

PEYTONA CANNEL COAL

From West Virginia.

Yields over 13,000 feet of Gas per ton. At ten thousand feet (standard yield) the illuminating power s over 43 candles. Purifies 4,510 feet to the bushel of lime.

S. E. LOW, Secretary,
Office, 58 Broadway.

WROUGHT IRON

ENAMELED GAS AND WATER PIPE,

MANUFACTURED SOLELY BY THE

NATIONAL TUBE WORKS COMPANY.

ALSO MANUFACTURERS OF

Lap-welded Steam and Gas Pipe,
Tubing and Casing for Artesian, Oil and Salt Wells (WITH PATENT PROTECTING COUPLING),
Lap-welded Iron Boiler Tubes,
Mack's Patent Injector, Etc.

WORKS AT BOSTON, MASS., AND McKEESPORT, PENN.

OFFICES AND WAREHOUSES.

New York, No. 78 William Street.
Buffalo, No. 216 Main Stree
Chicago, Nos. 112, 114 & 116 Lake Street,
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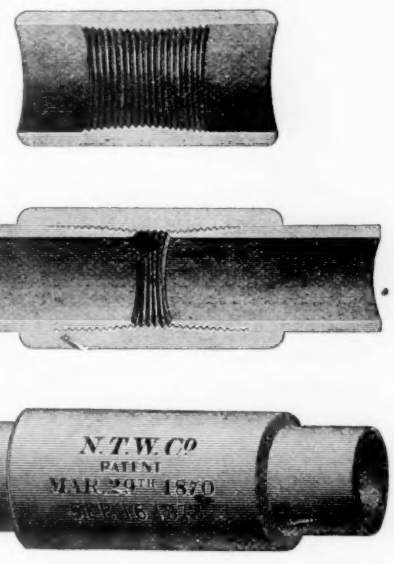

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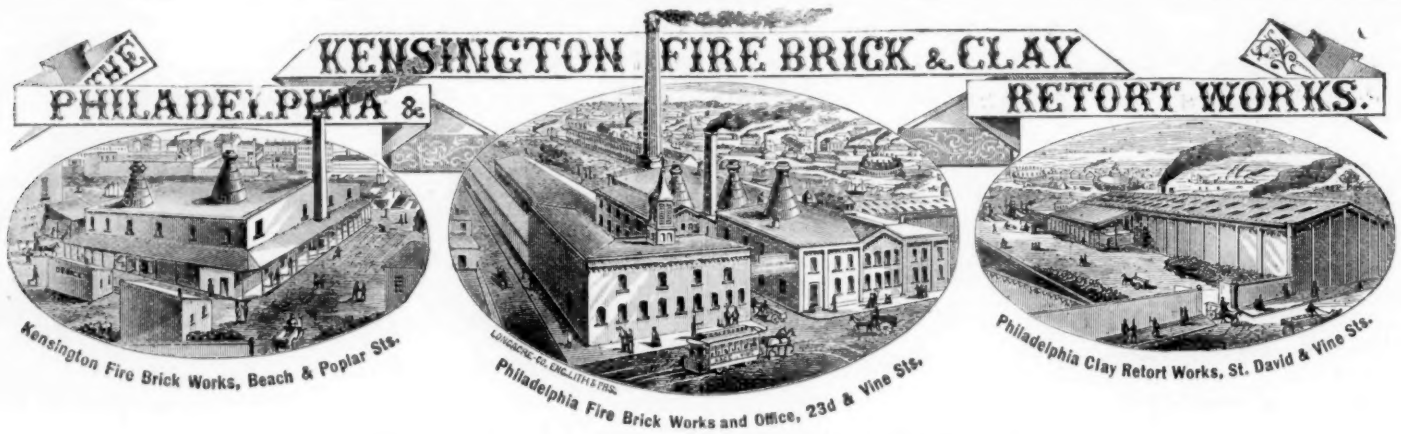
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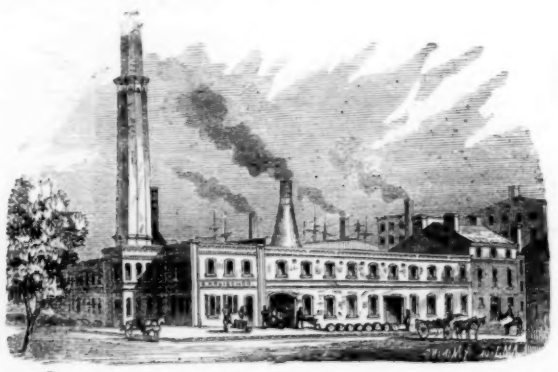

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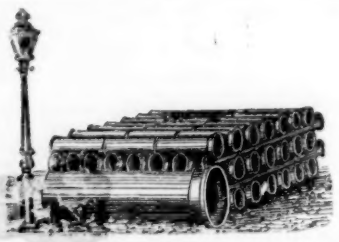

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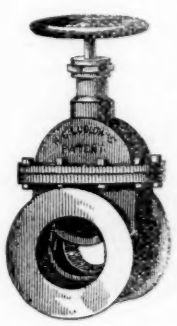

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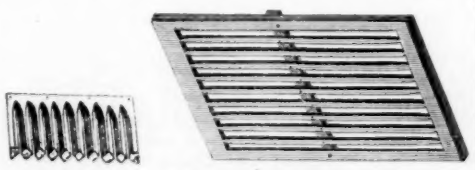

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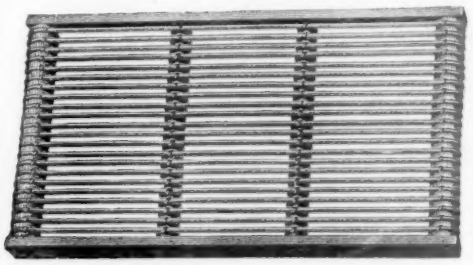

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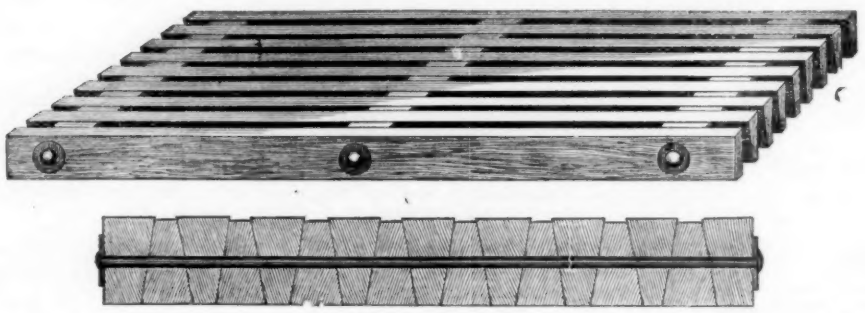

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